October 2009

IBM® Information Infrastructure

Business Partner Guidebook

A Seller's Roadmap to IBM Storage Solutions

Edited by
Jim Hoskins

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IBM Information Infrastructure Business Partner Guidebook

Ninth Edition

A Seller's Roadmap to IBM Storage Solutions

Edited by Jim Hoskins

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- Find detailed IBM product information quickly

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- Competitive info on COMP
- Competitive info on PartnerWorld

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More on the Web

- Explore training and certification opportunities

Now is a good time to make your plans. Select your role from the list of certifications. Follow the links to complete descriptions of each role, skills, recommended education, and more.

Introduction

About This Guidebook

This MaxFacts™ interactive guidebook brings together—all in one place—the resources you need to be successful as an IBM System Storage Business Partner. It contains information gathered and adapted with permission from multiple IBM and non-IBM sources. There are embedded links to more detailed and fast-changing information maintained on the Web so you can have the most current information at your fingertips. We are confident you will find this a useful tool. As we are always working to better help you succeed, please forward any suggested improvements to this guidebook to info@maxpress.com.

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1

You and IBM System Storage Offerings

In this chapter we take a look at some business basics about IBM and our System Storage Information Infrastructure offerings to consider as you move forward with your own business.

Why Team with IBM?

If you are seeking to truly differentiate yourself in the marketplace by extending your market reach with more profitable end-to-end solution offerings, IBM is uniquely positioned to help you make this happen. IBM provides you with an integrated portfolio of hardware, software, services, and channel programs that can take your business wherever you want it to go. IBM is committed to helping your clients realize business innovation through industry leading technology, open standards support, and proven best practices.

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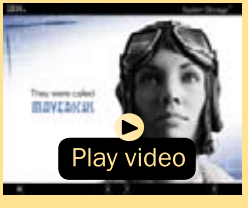


50 Years of Disk Innovation

IBM is a trusted vendor, committed to helping you deliver measurable value to your SMB and enterprise clients. It is this dedication to the success of our channel partners that helped IBM earn a Five-Star Partner rating for 2007 from VARbusiness Magazine as well as a Channel Champion Award for Pro-

grams and Support in the SMB/Volume Server category from Computer Reseller News Magazine.

IBM collaborates across a worldwide ecosystem of business partners to deliver industry leading and cost efficient business solutions. By providing innovative technology that delivers flexibility and high performance, easy to administer programs, and flexible financing options, IBM has an unmatched understanding and appreciation of channel importance that translates into success and prosperity for our partners.

Consider these facts about IBM:

- One of the world's top 10 most valuable brands
- A market leader in the storage and server industries
- Second largest software business in the world
- In each year for over a decade, IBM has earned more patents than any competitor, according to the U.S. Patent Office.

It is an exciting time to be involved with information technology. The worlds of business and computer systems are blending in ways that will result in productivity breakthroughs greater than the sum of their parts. Teaming with IBM will allow you to provide the insight, solutions, and innovation that matter to help your customers succeed.

A Smarter Planet

IBM has launched a new leadership agenda to help build a smarter planet which will help guide the development and deployment of IBM hardware, software, and services. The

smarter planet agenda is born out of the need for change. Our political leaders are not the only ones who have been handed a mandate for change. Leaders of businesses and institutions everywhere have a unique opportunity to transform the way the world works.

We find ourselves at this moment because the crisis in our financial markets has jolted us awake. We are seriously focused now on the nature and dangers of highly complex global systems. And this isn't our first such jolt. Indeed, the first decade of the 21st Century has been a series of wake-up calls with a single theme: the reality of global integration. The world is becoming increasingly instrumented, interconnected, and intelligent.

The problems of global climate change and energy, global supply chains for food and medicine, new security concerns ranging from identity theft to terrorism—all issues of a hyper-connected world—have surfaced since the start of this decade. The world continues to get "smaller" and "flatter." But we see now that being connected isn't enough. Fortunately, something else is happening that holds new potential: the planet is becoming smarter.

That is, intelligence is being infused into the way the world literally works—into the systems, processes, and infrastructure that enable physical goods to be developed, manufactured, bought, and sold… that allow services to be delivered… that facilitate the movement of every-

More on the Web

- IBM CEO Sam Palmisano on A Smarter Planet
- A Smarter Planet info on IBM.com

thing from money and oil to water and electrons… and that help billions of people work and live.

Dynamic Infrastructure

A key element of IBM's Smarter Planet initiative is known as the dynamic infrastructure. This is IBM's strategy to help IBM clients create an IT infrastructure that is designed for today's instrumented, interconnected, and intelligent world, transforming physical and digital assets into higher valued services. A dynamic infrastructure helps IBM clients transform their current business and IT infrastructure to address their top three imperatives (improve service, reduce costs, manage risk) through a structured approached. A dynamic infrastructure is highly optimized to achieve greater results and deliver superior business and IT services with agility and speed. IBM System Storage products and services help implement the Information Infrastructure element of a dynamic infrastructure.

More on the Web

- Dynamic infrastructure overview on IBM.com
- Dynamic infrastructure messaging guide
- Dynamic infrastructure specialty

Why IBM Information Infrastructure

IBM Information Infrastructure helps organizations manage the incredible explosion in the amount and types of digital information even during difficult economic times. IBM Information Infrastructure can help clients lower storage acquisition costs by up to 70 percent while improving data resiliency and

security. Today, IBM expands its proven capabilities in core technologies such as deduplication, virtualization, encryption, and solid-state storage. New solutions are available for larger organizations using mainframes, as well as midsize organizations. New Smart Business Systems simplify deployment of private cloud solutions for archiving and network file services.

IBM Information Infrastructure can do much more than help reduce costs. IBM Information Infrastructure is also an important enabler of information-led transformation, which is key to growth for many organizations.

Information-led transformation is a process through which organizations turn information into a strategic driver for innovation, business optimization, and competitive differentiation. Information-led transformation can help clients use information more pervasively across the organization, leverage analytics to take a predictive view of the business, make real-time decisions, and discover new kinds of intelligence from the information at hand.

As organizations build new information-driven or information-based products and services, throughput and availability requirements will increase dramatically. IBM enables information-led transformation with innovative technology that breaks through traditional performance barriers, and best practice-based services to help clients manage the transition. An example is smart use of solid-state storage, where IBM storage arrays and virtualization controllers with a small amount of solid-state disk can deliver up to 300 percent more throughput.

IBM Core Technologies to Drive Your Information Infrastructure

IBM solutions are optimized for the unique needs of midsize organizations, large enterprises, cloud computing providers, and others. Clients can get just what they need, saving time and money. A key benefit of selecting IBM for your next information infrastructure project is access to a broad portfolio of outstanding products and services. IBM offers highly rated, patented technology that delivers unique value.

Some IBM differentiating capabilities include:

- Storage virtualization—Reduce SAN disk costs by increasing utilization up to 30 percent or more.
- Data deduplication—Lower storage acquisition costs by up to 70 percent or more while reducing energy, cooling, floor space, management requirements, and maintenance costs.
- Solid-state storage architectures—Improve drive access response time up to 800 percent without application tuning.
- Next generation scaleable storage—Revolutionary disk systems can help deliver Tier 1 functionality at Tier 2 costs.
- Mainframe storage—Mainframe optimized tiered storage. First-to-market drive level drive encryption. Up to 300 percent increase in transaction throughput with only 5 percent solid state storage.
- Self-encrypting storage and security management—Encryption at the drive level improves security with little or no performance impact.

- Information archiving—Optimize application performance and simplify application administration, while lowering total costs.
- Business intelligence platform integration—Collerate disparate information across the value chain up to 600 percent faster.
- Continuous data protection—Get applications and users up and running within minutes following a data loss.
- Storage infrastructure management—Improve storage utilization up to 20 percent and simplify administration.

No other major vendor can match IBM's breadth of information infrastructure capabilities. IBM offers integrated solutions for consolidation, data protection, storage management simplification, compliance support, and more. IBM technology includes SAN and NAS disk systems, tape systems, SAN switches, storage management software, services, self-encrypting storage with key management, non-erasable non-rewriteable storage for regulatory compliance, and flexible financing for large and midsize organizations.

More on the Web

- Master sales kit for Business Partners
- Overview sales kit for Business Partners
- Mid-market sales kit for Business Partners
- Information Infrastructure two-page leaflet

2

Information Infrastructure Basics

In this chapter, we will quickly review the core capabilities of the IBM information infrastructure offerings.

IBM Core Technology Capabilities

IBM has developed significant capabilities in a number of critical technology areas that give clients the ability to manage their information more effectively. IBM investments in information infrastructure technology, both internal development and acquisitions, have exceeded $3 billion in the past three years. Clients are now benefiting from the results.

Storage Virtualization

IBM storage virtualization solutions enable clients to overcome the limitations and frustrations of mixed storage environments and make information available where and when it's needed. IBM storage virtualization also enables clients to dramatically improve asset utilization and simplify administration by virtually consolidating different disk systems into pools of shared capacity. Storage virtualization helps administrators to manage more with less effort, helping to control operating expenses as the infrastructure grows.

IBM storage virtualization is unique in the industry for the following reasons:

- SAN Volume Controller is a proven storage virtualization system with over 15,000 engines sold to date running in more than 5000 SVC systems
- SVC is the first storage virtualization system to offer integrated support for solid-state disks delivered in a highly-scalable manner to suit both entry and large enterprise requirements
- SAN Volume Controller delivers a common approach to storage virtualization for a wide range of virtualized server environments including IBM PowerVM, VMware, Hyper-V, and XEN
- N series offers integrated VMware support, including deduplication
- IBM Proventia Virtualized Network Security Platform integrates security processes into the VMware provisioning process
- IBM has a comprehensive solution for storage virtualization. Virtualization offerings are available for all IBM server and storage platforms, and even non-IBM disk. Storage virtualization is available for disk, tape, storage networks, and file systems.

IBM has decades of experience developing innovative products and supporting clients with virtualized storage and servers. Virtualization is the logical representation of resources not constrained by physical limitations. Benefits can include:

- Improved user flexibility

- Centrally manage many resources as one
- Dynamically change and adjust across the infrastructure
- Create many virtual resources within a single physical device
- Eliminate trapped capacities.

Storage virtualization can have the following benefits:

- Better application and information availability
  - Move applications without disruption to users
  - Deploy applications faster
  - Move data safely without disruption to applications
  - Simplify use of tiered storage
  - More flexible disaster recovery
- Remove limitations of physical infrastructure
  - Enable information management without concern about information location
  - Increase flexibility and responsiveness to business requirements
  - Ease deployment of multi-vendor environments
- Simpler infrastructure and management
  - Logically consolidate without physical consolidation
  - Physically consolidate while keeping workloads separate

  - Simplify and standardize management
  - Improve administrator productivity
  - Improve resource utilization.

Storage virtualization solutions from IBM are available for several parts of the information infrastructure stack, including disk, tape, network, files, and file systems. Clients can implement 100 percent virtualized environments, or focus on one layer at a time, as needed, to relieve bottlenecks.

- Disk virtualization—SAN Volume Controller supports over 130 IBM and non-IBM storage systems
  - New SVC hardware delivers up to 2x better price/performance for most applications and can support up to 800,000 read IOPS at less that 1 ms response time with new SSD option
  - New IBM Tivoli Storage FlashCopy Manager provides tight integration between SVC replication and server software to speed backups and improve availability
- Tape virtualization—IBM Virtualization Engines TS7600, TS7700, and VTFM
  - Accelerate backups and recalls by using a tiered hierarchy of disk and tape, making more efficient use of tape drives.
- Network virtualization—IBM converged switches and adapters

  - Manage service levels with virtualized 10 Gb Fibre Channel over Ethernet (FCoE) switches and adapters. Larger SAN Directors also offer virtualization.

- File and file system virtualization
  - Scale-out File Services can manage 500 billion files with fast file retrieval and integrated data protection
  - Virtual File Manager delivers a simple user interface for multiple network file systems

- Virtualized server support
  - SAN Volume Controller supports a very wide range of virtualized server environments
  - N series offers integrated VMware support, including deduplication
  - IBM Proventia Virtualized Network Security Platform integrates security processes into the VMware provisioning process.

Data Deduplication

Data deduplication has emerged as a key technology in the effort to dramatically reduce the amount and the cost associated with storing large amounts of data. Deduplication is the art of intelligently reducing storage needs better than common data compression techniques—through the elimination of redundant data so that only one instance of a data set is

actually stored. IBM's new offerings enable customers to easily harness the power of deduplication without making radical changes to their computing environment.

IBM data deduplication solutions are unique in the industry for the following reasons:

- ProtecTIER Gateways and Appliances can deliver over 1000 MB/sec throughput, with 25:1 reduction in storage, up to 9x faster than competitors!
- N series offers primary storage deduplication, which reduces physical storage 50 percent, on average.
- TSM version 6 delivers powerful deduplication capabilities for disk storage pools with a simple software upgrade.
- IBM has the broadest portfolio of deduplication solutions in the industry to solve customer issues with the most effective technology. Whether it's source or target, inline or post, hardware or software, disk or tape, IBM has a solution with the technology that best solves the problem.

Benefits of data deduplication can include:

- Reduced storage capacity required for a given amount of data
- Ability to store significantly more data on the same size disk
- Restore from disk rather than tape may improve ability to meet recovery time objective (RTO)
- Lower storage-management cost resulting from reduced storage resource requirements.

Data Deduplication and Data Reduction

Data deduplication is a method of reducing storage needs by eliminating redundant data. Only one unique instance of the data is actually retained on storage media, such as disk or tape. Redundant data is replaced with a pointer to the unique data copy.

Data reduction is the removal of old, stale, or orphaned data from an active disk AND removing duplicate data to save time and space, thus improving the ROI and TCO or an existing investment.

Data deduplication and data reduction solutions from IBM are available for several parts of the information infrastructure stack, including virtual tape, backup disk storage pools, email archives, and primary disk storage. IBM clients can launch a centralized deduplication project, or migrate to products that include deduplication over time, to reduce operating expenses.

- High throughput in-line deduplication—ProtecTIER Gateways and Appliances
  - Independently measured at over 1000 MB/sec, with 20:1 reduction in storage.
  - Appliances are available in multiple sizes for simpler implementation in midsize data centers.
- Primary NAS Storage—N series Deduplication
  - Primary storage deduplication reduces physical storage 50 percent, on average.

- Backup and File Archive—Tivoli Storage Manager
  - Deduplication in disk pools means more restores and retrievals happen from disk rather than tape. Included in TSM v6.
- Email Archive—IBM Content Collector
  - Duplicate emails and attachments can be eliminated from archive storage.
- Data Reduction—Tivoli Storage Productivity Center, Storage Enterprise Resource Planning (SERP), DB2
  - Reduce physical storage by up to 20 percent by identifying duplicate objects and potential wasted space in file systems and databases.
  - Reduce database storage requirements by over 50 percent with DB2 compression.
- IBM Tivoli Storage Manager
  - Automate data backup, restore, and archive functions. Centralize storage management operations. Includes deduplication for storage pools.
- N series Deduplication
  - Support deduplication for primary storage on easy-to-operate NAS storage.

More on the Web

- Red Paper: N series A-SIS Deduplication Deployment and Implementation Guide

- Content Collector
  - Better manage the growth of email and file systems, while mitigating information risks.

Solid-State Storage Architectures

Solid-state storage means using a memory-type device for mass storage, rather than spinning disk or tape. First-to-market devices are the shape of standard hard disks, so they plug easily into existing disk systems.

Solid-state storage is available for all IBM server platforms and in IBM's storage virtualization engine, SAN Volume Controller. IBM is developing techniques for applications to exploit solid-state storage more efficiently, starting with DB2.

Solid-state storage technology can have the following immediate benefits:

- Significantly improved performance for hard-to-tune, I/O bound applications. No code changes required.
- Reduced floor space. Can be filled near 100 percent without performance degradation.
- Faster IOPS
- Faster access times

- Reduced energy use

IBM solid-state storage architectures are unique in the industry for the following reasons:

- IBM performs primary research to develop solid-state storage technology, resulting in several patents already.
- IBM is first to market with a solid-state storage virtualization controller
  - Builds on IBM Quicksilver technology demonstration. Up to 800,000 read IOPS with no application tuning.
  - Move data to solid state storage without application disruption.
  - Supports non-IBM storage, too.
- Smart Data Placement enables affordable use of solid-state storage technology for DB2 applications.
  - With less than 10 percent solid-state storage, Smart Data Placement can deliver over 90 percent of the throughput increase of all solid-state arrays; substantially reducing capital expenses for high performance storage solutions.

IBM supports three initial architectures for solid-state storage technology:

- Emulated drive in existing disk systems
- Optimized controller
- Internal server storage.

Solid state storage technology can have the following benefits:

- Significantly improved performance for hard-to-tune, I/O bound applications. No code changes required.
- Reduced floor space. Can be filled near 100 percent without performance degradation.
- Faster IOPS
- Faster access times
- Reduced energy use.

Solid-state storage continues to be expensive relative to hard disks, putting it out of reach for all but the most important applications. IBM is making solid-state storage affordable, with innovative architectures, system and application integration, and management tools that enable effective use of solid state storage.

Solid state technologies will continue to evolve. IBM researchers have been making significant breakthroughs. IBM will continue to bring the best implementations to our customers. Extensive work and innovation is still required to bring the full value of this technology to market.

Solid state storage solutions from IBM are available for all three implementation models including:

- Emulated drive in existing disk systems—DS8000 and DS5000
- Optimized controller—SAN Volume Controller

- Internal server storage—IBM Power Systems, BladeCenter, and System x.

IBM capabilities include:

- Solid-state storage virtualization controller—SAN Volume Controller
  - SVC is the first storage virtualization system to offer integrated support for solid-state disks delivered in a highly-scalable manner to suit both entry and large enterprise requirements
  - Builds on IBM Quicksilver technology demonstration and delivers up to 800,000 read IOPS at less than 1 ms response time
  - Moves data to solid state storage without application disruption
  - Supports traditional magnetic disk storage.
- Smart data placement—DB2 and DS8000
  - Enables affordable use of solid-state storage technology. With less than 10 percent solid-state storage, Smart Data Placement can deliver over 90 percent of the throughput increase of all solid-state arrays; substantially reducing capital expenses for high performance storage solutions.

More on the Web

- Press Release: Solid-state drive sets speed record, Sept. 2008
- White Paper: IBM System z and System Storage DS8000: Accelerating the SAP Deposits Management Workload With Solid State Drives, 2009
- White Paper: Driving Business Value on Power Systems with Solid State Drives, April 2009
- Redpaper: Ready to Access DB2 for z/OS Data on Solid-State Drives, 2009
- Redpaper: DS8000: Introducing Solid State Drives, 2009
- Techdoc: IBM System Storage DS8000 with SSDs: An In-Depth Look at SSD Performance in the DS8000
- Press Release: IBM Helps Companies Gain Control of Their Information with Solid State Flash Technology, May 2009

- Solid-state storage is available for all IBM server platforms.
  - — Up to 800 percent improvement in back-end drive response times.

Next Generation Scaleable Storage

Next generation applications need next generation storage. Many new applications manage rich data, need always-on availability, and have the potential for rapid scale up and scale down. Next generation applications often start as ideas in a lab, but have the potential to grow very large. Traditional storage systems are optimized for entry, midrange, or enterprise workloads. While there is overlap, most traditional storage systems have a price/performance sweet spot in one of

the three categories. Next generation applications are challenged by traditional storage because of the high entry cost of enterprise storage and the impracticality of changing from entry to enterprise storage in the middle of a growth spurt. IBM's Next Generation Storage Systems, including XIV and Scale Out File Services (SOFS), enable clients to leverage grid-based storage architectures to address critical "next generation" requirements such as the need for massive scalability, simplified operation complexity, improved administrator productivity, and lower overall IT costs and energy costs per TB of data. IBM's Next Generation Storage Systems solutions are unique in the industry for the following reasons:

- XIV can rebuild a failed drive in about 30 minutes with minimal performance impact, compared to hours of degraded performance with other solutions.
- XIV includes over 50 patents.
- Scale-out File Services can manage 500 billion files with fast file retrieval and integrated data protection.
- Scale-out File Services leverages GPFS, a file system proven to scale with daily use in some of the largest supercomputer environments.

Next generation scalable storage solutions from IBM use grid architectures. The inherent benefits of grid storage address the inherent requirements of next generation applications:

- Start small and grow

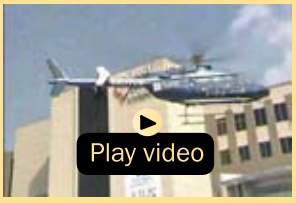
- Use standard hardware for lower acquisition and upgrade costs
- Scalability
- Non-disruptive upgrades.

The benefits are real. Some examples include:

- IBM was able to reduce costs by managing more than 92,000 worldwide users with one storage cloud and one delivery team.
- Iowa Health System saw a 90 percent lower cost for data management due to simplified operations and the use of standard high capacity hardware.
- HDMS, a subsidiary of Aetna, experienced a 70 percent performance increase in core SAS application, while reducing energy, floor space, and administrative expenses.
- Virginia Commonwealth University noticed an immediate 6°F drop in data center temperature after migration to IBM Next Generation scalable storage.

Grid solutions deliver near linear scalability because they allow the addition of new nodes. Nodes include CPUs, memory, network interfaces, and storage; connected to other nodes by a fast interface bus. IBM capabilities include:

- Scalable block storage—IBM XIV Storage System
  - Automated and virtualized data management and dramatically simplified systems management help tame your dynamic workloads.



Iowa Health (3:29)

Spectrum Health (3:41)

Virginia Commonwealth University (3:49)

- Scalable file storage—IBM Scale-out File Services
  - — Simplify operations with one global namespace and one point of management for up to 500 billion files.
- Medical image management—IBM Grid Medical Archive Solution
  - — Multi-node architecture and advanced replication enable high availability. Efficient components reduce operating expenses.

Mainframe Storage

Large applications that depend on high availability and short recovery time objectives can often improve efficiency and effectiveness with IBM Storage solutions. IBM offers comprehensive data protection capabilities, scalability, and reliability. IBM offers optimized enterprise storage solutions for Linux, UNIX, Windows, and z/OS environments. IBM solutions include disk, tape, virtualization, management software, and consulting services.

IBM enterprise storage solutions are unique in the industry for the following reasons:

- As the owner of System z architecture, IBM is in a unique position to leverage the strong synergy between System z hardware, software, and storage. The result is a number of first-to-market capabilities that drive additional client value. Examples include:
  - Solid state disk tooling for DB/2 for breakthrough price/performance
  - Multiple readers for improved z/OS Global Mirror throughput
  - Extended address volumes for very large data sets
  - Multitrack support for high performance FICON for increased channel utilization and higher data throughput.
- As the owner of POWER architecture, IBM is in a unique position to leverage CPU technology to drive storage array performance. The result is a number of capabilities that deliver improved price/performance, including:
  - Optimized use of cache
  - Improved recovery time objectives (RTO)
  - Optimized use of POWER and ASIC technology
  - Faster upgrades to new chip technology.

- IBM has been the market share leader for enterprise branded tape for several years in a row.
- Media encryption at the drive level, for both disk and tape, enables a new way to improve data security with little or no performance impact.

Self-Encrypting Storage and Security Management

IT security is complex, but can be summed up very simply: Let the good guys in, keep the bad guys out … and be able to prove it. For many organizations, information privacy is an IT challenge that continues to defy simple answers and generate negative publicity. Because of mandatory disclosure laws in many countries, more data security breaches must be reported. In some countries, victims are entitled to compensation.

> *"The latest enhancement of the 'thin provisioning' for the high-end DS8000 is answering end users' requirements for better storage economics, lower energy requirements, and better environment protection. The DS8000 is not missing any functionality, ensures advanced availability features, and all this at an excellent price/performance ratio."*
>
> *— Josh Krischer, Krischer and Associates, June 2009*

Companies are at risk from external hackers, accidental loss, and internal theft. Since 84 percent of security breaches are internal, we can't simply install better locks on the doors.

The total cost of security breaches can include:

- Loss of customer information
- Loss of customer confidence

- Loss of intellectual property
- Legal and regulatory exposures
- Loss of brand equity
- Cost of remediation
- Business disruption.

Lost business now accounts for 69 percent of data breach costs, up from 65 percent in 2007 and 54 percent in 2006 according to "2008 Annual Study: Cost of a Data Breach," Ponemon Institute.

Think it can't happen to you? In 2008, the UK Royal Air Force lost three unencrypted hard disks in a secure data center, on a secure military base. Failure to fully disclose the security breach for several months compounded the costs to the RAF and elected officials.

IBM drive level encryption for both disk and tape addresses a security exposure at little or no cost, with little or no performance impact. The benefits of storage encryption and key management include:

- Enables secure sharing of information with employees, customers, and suppliers
- Less cost and risk from lost or stolen media
- Simple disk sanitization
- Simplified auditing and reporting
- Helps implement best practices and policies consistently.

IBM encryption and key management solutions are unique in the industry for the following reasons:

- IBM was first to market with drive level encryption for disk and tape, both enterprise and midrange.
- Drive level encryption and centralized key management is proven to be fast, scalable, and efficient:
  - Fast: Encryption has little or no performance impact
  - Scalable: Able to encrypt many devices in parallel
  - Efficient: Able to compress before encryption, reducing media expenses. Other external encryption designs create data streams that can't benefit from drive-level compression.

IBM Information Infrastructure offers a variety of information security solutions designed to help organizations address virtually any dimension of a secure infrastructure. IBM has the knowledge and expertise to help customers deploy tactical security solutions, as well as design and implement full end-to-end security across the extended enterprise.

IBM is committed to providing the right technologies and expertise to deliver leading edge information security solutions to both large and small businesses, including identity and access management, intrusion protection, compliance monitoring, and professional services that customers can use to design and implement holistic solutions across the enterprise.

IBM Security Management solutions are unique in the industry for the following reasons:

- IBM Internet Security Systems (ISS) offers the industry's only security guarantee with managed security services offering up to 55 percent savings in IT security management costs.
- ISS was ranked number one for Managed Security Services and Vulnerability Assessment by Frost & Sullivan.
- IBM Tivoli was ranked number one for Identity Management by Frost & Sullivan.
- Tivoli is the market share leader in Identity and Access Management, according to top analysts.
- IBM is the market share leader in Application Security Vulnerability Scanning, according to top analysts.
- In April 2009, NSS Labs, a leading global independent testing lab that focuses on security product testing and certification, awarded the IBM Proventia Network Intrusion Prevention System (IPS) appliance GX6116 the highly coveted "Gold" Award.
- IBM has the unmatched global and local expertise to deliver complete solutions—and manage the cost and complexity of security.

What is Self-Encrypting Storage?

Self-encrypting storage is a design, pioneered by IBM, where an encryption chip is built into the storage device, rather than an external component. Self-encrypting storage has important advantages over other media encryption designs:

- Fast: Encryption has little or no performance impact

- Scalable: Able to encrypt many devices in parallel
- Efficient: Able to compress before encryption, reducing media expenses. Other external encryption designs create data streams that can't benefit from drive-level compression.

On May 9, 2008, the U.S. National Security Agency (NSA) reported that it evaluated the drive-level encryption used by IBM and determined that it is "acceptable for the protection of sensitive but unclassified information in national security system solutions, and is acceptable for use with other approved assurance mechanisms in classified national security systems."

The benefits of storage encryption and security management are:

- Enable secure sharing of information with employees, customers, and suppliers
- Less cost and risk from lost or stolen media
- Simple disk sanitization
- Simplified auditing and reporting
- Helps implement best practices and policies consistently.

IBM capabilities in self-encrypting storage and security management include:

- Drive level media encryption (Disk: DS8000, DS5000; Tape: LTO4, TS1130)

  - Drive level media encryption has little or no performance impact, so clients can implement 100 percent encryption. Encryption means one less worry for risk managers.
  - IBM was first to market with drive level encryption for disk and tape, enterprise and midrange.

- Security management (Tivoli Key Lifecycle Manager, Tivoli Identity Manager, Tivoli Access Manager, Tivoli Security Information & Event Manager)
  - Open standards, ease of integration, simplified operations, and automated reporting help mitigate information risks efficiently and effectively.
  - Tivoli Key Lifecycle Manager generates keys for self-encrypting disk and tape drives.

- Security services and appliances (Internet security systems)
  - Comprehensive, flexible, and adaptable security solutions that provide visibility and control over the entire realm of IT security.
  - The industry's only security guarantee with managed security services offering up to 55 percent savings in IT security management costs.
  - IBM has the unmatched global and local expertise to deliver complete solutions—and manage the cost and complexity of security.

Archiving

As today's IT professionals consider the complex mix of issues brought on by information growth, archiving emerges as a logical solution to the challenges surrounding information storage and accessibility. Archiving can help improve productivity, control infrastructure and legal costs, and manage compliance and operational risks.

The IBM archiving and retention strategy supports a policy-based tiered storage environment that blends storage media—different types or tiers of storage, such as disk, tape, and optical—in order to create cost efficiencies. IBM solutions are designed to offer seamless migration between media and can optimize information availability and performance.

IBM has a breadth of capability to help clients with archiving projects. IBM offers a complete solution, or just the pieces needed.

- Archiving applications:
  - Email, SAP, images, and business records—Content Collector, Content Manager, and FileNet
  - Databases, database applications, mainframe applications—Optim
  - Medical images—Grid Medical Archive Solution
- Archive/HSM infrastructure:
  - System Storage Archive Manager/Tivoli Storage Manager
  - N series

  - Scale-out File Services

- Information retention systems:
  - IBM DR550 Data Retention System
  - N series with SnapLock
  - Tape, optionally with WORM or encryption
  - Disk, low cost high capacity SATA
  - Grid storage
- Expertise
  - IBM Enterprise Archive Services.

Business Intelligence Platform Integration

Organizations must tap into the intelligence of the entire value chain, correlating insights and anticipating opportunities and threats. IBM Business Intelligence platform integration solutions are unique in the industry for the following reasons:

- IBM is singularly able to address this need based on its ability to integrate a deep understanding of IT systems, cutting-edge technologies, the capabilities of partners, and meaningful business insights to drive better optimization.
- They offer improved performance and reduced storage requirements: Performance improvements up to 600 percent and reduced storage requirements up to 70 percent.
- They offer proven scalability that supports thousands of users and petabytes of data.

- IBM is both a Business Intelligence platform provider, with DB2 and Cognos, and a partner with other BI platform providers including Oracle, SAP, and Sybase.

There is no bigger problem facing individuals and organizations today than the reality that they can't keep pace with the information explosion. Organizations must tap into the intelligence of the entire value chain, correlating insights and anticipating opportunities and threats. IBM is singularly able to address this need based on its ability to integrate a deep understanding of IT systems, cutting-edge technologies, the capabilities of partners, and meaningful business insights to drive better optimization. IBM provides the tightly integrated information infrastructure that clients require as a foundation for implementing this new intelligence.

More on the Web

- Business Intelligence info on IBM.com

IBM provides business intelligence platforms that allow companies to optimize their business processes, delivering:

- End-to-end solutions: IBM and ISV solutions that are pretested, preconfigured, easy to install and maintain, and rightsized for clients' environments
- Improve performance and reduce storage requirements: Performance improvements up to 600 percent and reduced storage requirements up to 70 percent
- Proven scalability that supports thousands of users and petabytes of data

- Improved decision-making, business insight, and time-to-business results.

Continuous Data Protection

Continuous data protection is a specific kind of storage management technology that gets applications and users back up and running within minutes following any data loss, while performing full data recovery in the background. This innovative technology eliminates the need for traditional backups and unpredictable restores by shadowing writes to a CDP server. Users can see their information on the CDP server, which minimizes disruption from disk failures.

Continuous data protection is available as a software offering, a hardware and software package, and as a pay-as-you-go cloud service. Continuous data protection currently supports recovery from Windows files and applications, including Microsoft Exchange, Microsoft SQL Server, Oracle, IBM DB2, and SAP.

Storage Infrastructure Management

Controlling the complexity of information infrastructures is critical for maintaining high availability at a reasonable cost. Monitoring and reporting tools typically have a rapid ROI because they automate tasks previously performed by specialists. With proper tools in place, specialists spend more time performing analysis, provisioning, and other more valuable tasks.

IBM Storage Infrastructure Management solutions are unique in the industry for the following reasons:

- End-to-end performance reporting across the storage stack can simplify problem determination and performance tuning.
- Management of both standard and virtualized storage, including non-IBM storage, means improved effectiveness and efficiency for administrators.
- Powerful storage resource management can identify up to 20 percent of storage for reclamation by identifying duplicate files across the enterprise.
- New continuous data protection solutions eliminate the need for traditional backups, and provide near-instant access to data in an emergency.

Benefits of storage infrastructure management can include:

- Simpler administration
- Improved performance, fewer bottlenecks
- More consistent configurations; fewer configuration errors
- Faster deployment
- Faster repairs
- Data reduction of up to 20 percent.

IBM storage infrastructure management solutions support IBM and non-IBM storage, giving administrators fewer monitors and reports to manage. The results can be simpler infrastructure management, more automation, better service, and lower total costs. IBM capabilities include:

- Disk management—SAN Volume Controller, Tivoli Storage software, XIV, N series
  - Virtualized storage—SVC can increase utilization by 30 percent or more with block virtualization, online copy services, and thin provisioning.
  - Monitoring and management—Tivoli Storage Productivity Center can improve SAN disk utilization up to 20 percent with a powerful management console and reporting interface for virtualized, non-IBM, and IBM disks. The new performance management module from IBM Research generates heat maps to illustrate end-to-end storage throughput.
  - Block storage—XIV includes provisioning, virtualization, self healing, and an easy-to-use GUI to simplify management of dynamic environments.
  - NAS storage—N series includes a consistent GUI that simplifies operations for part-time or inexperienced administrators.
- Data protection—Tivoli Storage Manager and TSM FastBack
  - Comprehensive data protection with customizable operational reporting.
  - Tivoli Storage Manager enables policy-based backup and retention and includes leading capabilities such as simple disk-tape migration, point-in-time recovery, disaster recovery management, and operational reporting.

  - TSM Fastback shadows disk writes to a recovery system, which enables near instant recovery of Windows files without the burden of performing Windows backups.

- Data migration—Data Mobility Services, Transparent Data Migration Facility

  - Transparent Data Migration Facility helps clients move application data across platforms with little or no downtime. TDMF runs on Windows, Unix/Linux, and mainframe z/OS.

3

General System Storage Resources

This chapter provides you with general information and valuable resources that will help you as you sell IBM products.

How to Sell IBM System Storage Products

In this section, we offer ideas that will help you identify and explore opportunities for selling IBM System Storage.

Identifying Storage Sales Opportunities

Following are some "triggers" that tell you there is a sales opportunity for IBM Storage.

General

- Is the customer buying servers? Server buyers tend to buy storage within three months of their server purchase.
- Is the number of users of the application increasing? Adding employees or upgrading applications generally leads to additional storage needs.
- Are existing storage assets coming off lease or nearing the end of the depreciation cycle? The data on multiple older storage controllers can often be consolidated onto a single newer, faster system with cost savings.

- Does the customer already have IBM external storage installed but is running out of capacity? This is an opportunity to upgrade the storage.

Information Availability

- Does your client have communities of users that need to share files?
- Can your client's employees and customers access data quickly enough to keep them productive?
- Has your client's IT services, applications, or data access been interrupted due to planned or unplanned outages?
- Has your client experienced slow response times or downtime of mission-critical and business-critical systems?
- Are globalization, time to market, and the pressures to reduce operational costs affecting your client's service levels?

Information Security

- Has the customer, or a competitor, experienced a security breach associated with its clients' personal information? Data encryption solutions can help protect customers' data and their reputation.
- Does the customer have increasing regulatory requirements driving the need for the retention and protection of data for audit and compliance?

- Does the customer store sensitive customer data off-site for archiving and worry about possibly losing tapes during the process?
- Does the customer have an increasing need to share data securely with partners, suppliers, and remote locations?
- Does the customer's existing encryption solution command too much processing power, such that applications sacrifice performance?
- Could they benefit from the ability to encrypt at near-native tape drive speeds?
- Does the customer need to reduce the complexity and improve processes around encryption key management to support short-term and long-term reliability and availability of keys over time?

Information Retention

- Does the customer need to keep large amounts of (infrequently accessed) data at a lower cost than typically provided by storage systems?
- Does the customer want to manage his/her data more efficiently and effectively through its lifecycle? System Storage Archive Manager offers policy-based information retention while supporting automated data migration from different storage systems.

- Does the customer want to reduce the amount of duplicate storage and achieve better storage utilization? IBM offers de-duplication technology and solutions to achieve optimization.
- Does the customer need a secure, non-erasable, non-rewriteable storage repository to address security integrity concerns? IBM offers DR550, System Storage Archive Manager, and WORM tape systems.

Information Compliance

- Does the customer need to protect his/her business data? IBM Tivoli System Storage Archive Manager, WORM tapes, and encryption solutions can help reduce the risks associated with data loss while helping to reduce complexity, manage costs, and address compliance with regulatory data retention requirements?
- Have any new government regulations for the customer's management of personal data become active? The DR550 with tiered storage can help comply with regulatory requirements, while delivering improved protection, security, and cost.
- Does the customer need to capture, secure, manage, and retain all relevant information and present the required information when challanged? IBM offers policy-based records management/content management tools and data classification and discovery management software for quick search and discovery of information upon request.

How to Facilitate a Storage Consolidation Discussion

Here are some pointers on how to start conversations with your clients and discover sales opportunities.

General

- Are your data storage needs growing?
- Are you spending money on distributed storage capacity attached to your servers that is not being fully utilized?
- Do you have storage systems coming off lease or nearing the end of their depreciation cycle?
- Who is your current storage vendor and are you happy with the TCO that your current storage vendor is providing you?

Information Availability

- Do you have communities of users that need to share files?
- Can your employees and customers access data quickly enough to keep them productive and happy?
- How do you ensure that your data is protected from loss?

Information Security

- How do you protect sensitive information today?
- Have you implemented data encryption for your information?
- Do you archive customer information off-site?

- If so, are you comfortable with the end-to-end security of that process and the implications of exposing end user information through a lost or stolen tape?
- Are you aware of the customer disclosure laws that governments are enacting to protect customers from businesses that lose their personal information?

Information Retention

- Are your data storage needs growing? Do you have a lot of inactive data sitting on your production servers? If so, would you like to get the inactive data off your primary systems and improve performance and lower your operational expense?
- Do you have needs to keep data for long periods of time? Do have a data retention system or strategy in place today? How long do you retain information? Does your business adequately address retention and disposal of regulated documents? (Information may become a liability if kept too long.)
- Is your retention system policy-driven? Leverage policy-driven storage management using multiple tiers of storage and retain content securely until the end of the retention period—whether the content is on disk or tape.
- Does your retention strategy allow you to migrate your archived data from disk to tape over time for cost savings?
- How will you maintain your data through technology turns?

- Does your retention strategy allow for media migration—for example when disk or tape wear out? Does it allow you to migrate to newer technology while keeping your data protected, safe, and accessible?
- Is your retention system immutable—that is, once data is written, it cannot be changed or deleted during the retention period? Do you need an immutable storage retention system?
- How do you ensure security of the data sitting on your systems for 10 or 20 years?

Information Compliance

- Are there government regulations with which you need to comply for your storage of information?
- Do you have a well defined data governance model that is consistently applied?
- Do you have the right systems and processes in place to capture, manage, and retain all relevant business information with security, integrity, and privacy?
- Do you have a policy-based records management system in place to capture and protect your business records so that policies are enforced automatically to help get your content under control without reliance on your users?
- Can you do a search and discovery of your records in a timely fashion to satisfy legal requests?

Typical Findings after Asking the Above Questions

- Multiple islands of storage are becoming hard to manage and are driving up costs.
- Performance is not always sufficient to meet users' needs.
- Reliability is not at desirable levels. Even a small outage is a big deal when it happens in a remote location.
- Storage capacity is not being used efficiently. Some users and servers need more storage, while capacity on other servers sits idle.
- Data backup is becoming hard to manage.
- Total storage costs are getting out of control as storage needs rise.
- Information is exposed to security risks that are not understood, or not managed.
- Regulatory requirements cannot consistently be met at the desired level.
- Personnel costs to manage storage are rising rapidly, or there is a shortage of manpower to complete all of the management work in a timely fashion.

Qualifying Questions

Here are questions you can use to gauge a possible sales opportunity:

- Are you under pressure to control costs and IT expenditures?

- How many servers and what operating systems do you have?
- What are the key applications that drive your storage demand?
- Can your storage scale easily to meet growth and new application needs?
- Are you unable to add additional storage capacity because of budget constraints?
- Are you concerned that you can't predict future growth? Do you need a storage system that can be upgradeable to higher capacity and performance without losing your initial investment?
- Do you often find that you are adding additional servers and associated storage to keep pace with your growth?
- Do you need more capacity and performance—at a better price?
- Does storage management cost you money for staffing, education, and time?
- How much benefit would you see from having a single interface—fewer tools to learn and use—for server and storage management?
- Are your storage needs satisfied by the internal storage in the server?
- Do you need to lower IT costs and complexity while still providing a computing infrastructure with high levels of server and storage performance typical for database and online transaction processing?

- Do you have a large number of server/storage platforms and/or operating environments?
- What competitive storage or server hardware is installed and which competitor(s) are bidding for the business (EMC, HP, Dell, Sun)?
- Do you need to run test applications against live data?
- Do you need the ability to set up a disaster recovery plan?
- Do you understand the risks and costs associated with data access delay or data unavailability? Do you have the skills to complete an analysis? (IBM does—storage study.)
- Are your backup windows getting shorter?
- Are you confronted with significant complexities of storage management and looking to simplify the environment?
- Do you need to improve the security of your information?

IBM PartnerWorld Website

IBM maintains a Website called PartnerWorld, which has a great deal of information of use to all IBM Business Partners worldwide. On the site you will find the latest presentations and marketing materials (such as brochures, data sheets, and case studies) as well as competitive information, consultant reports, IBM white papers, education and events, tools, technical support, and much more.

In this ebook, we have summarized and provided direct links to much of the PartnerWorld information that is most

important to IBM System Storage Business Partners. As such, this ebook is your personal "guide" to the PartnerWorld Website. Just the same, we encourage you to spend some time just browsing the PartnerWorld site so you can get a feel for the full scope of resources available to you.

More on the Web

- IBM PartnerWorld Website
- IBM PartnerWorld news and newsletters
- Regional shortcut to U.S. PartnerWorld content
- Help with your IBM PartnerWorld user ID and password

You will need your IBM-assigned user ID and password to access some areas of PartnerWorld. If you don't have your user ID and password, you can contact IBM PartnerWorld help. (Follow the link in the "More on the Web" box.)

Storage News and Events

You can keep current with the fast paced world of IBM System Storage by frequently checking the link shown in the "More on the Web" box.

More on the Web

- IBM Storage news and events

Incentives and Promotions

IBM offers many incentives and promotions for both business partners and your clients to help drive sales. You can find a list of the most

More on the Web

- Incentives and promotions for storage
- Cross brand incentives and promotions

current incentives and promotions by following the "More on the Web" links.

System Storage Education

As with almost any endeavor, time spent educating yourself and your team on appropriate topics such as selling techniques and storage product offerings will help you succeed. In this chapter, we discuss two ways you can get the education you need to succeed in selling with IBM System Storage products.

PartnerWorld University

The IBM PartnerWorld University is a Web-based repository of information in many different formats. It provides technical and sales information to help you succeed as a storage business partner. You will need your PartnerWorld user ID and password to access these resources.

More on the Web

- PartnerWorld University

IBM Training

IBM Training provides an array of education offerings including instructor-led training in traditional classrooms, customized training services at client locations, and IBM technical conferences built around IBM Systems platforms and solutions.

In addition, IBM also provides technical training offerings that build integration skills around the IBM Systems portfolio

More on the Web

- IBM Training

and complementary solutions from other strategic partners, such as Cisco, Linux, ISC(2), and VMware.

Systems College

IBM Systems College is a key education resource offering sales and technical training, education roadmaps, certification information, tools, resources, and much more. Take advantage of on-demand learning opportunities to help you become more successful today and over the long term.

Within Systems College are the job role roadmaps, designed to build strong selling and product knowledge skills. The job role roadmaps categorize training under basic, intermediate, and advanced levels. Course and roadmap completion are automatically tracked to demonstrate progression through the various training paths.

More on the Web

- Systems College

IBM Professional Certification Program

The IBM Professional Certification program offers a business solution for skilled IT professionals who seek to develop and demonstrate their expertise to the world. It's designed to validate your skills and demonstrate your proficiency in the latest IBM technology and solutions. It helps to make certain that you have the capability to perform role-related tasks and activities at a specified level of competence. The program is beneficial for those who wish to validate their

More on the Web

- IBM Professional Certification info

skills, as well as for companies that wish to ensure certain performance levels for their employees. Skills attainment is a key element for Business Partner firms to move from Member to Advanced level in PartnerWorld.

IBM Professional Certifications are associated with an individual, not a company or an organization. The target audience for certification includes employees of Business Partner firms, customers, IBM employees, and independent consultants who sell, support, or service IBM products.

Here is your path to certification:

1. Select the role that most closely represents your daily tasks—the test objectives will describe all skills tested for each role.
2. Review those objectives.
3. If you are comfortable with and have daily experience with all listed objectives, you are ready to enroll for the test on the Web at 2test.com.
4. If you are not familiar or comfortable with some of the objectives, review the recommended education for related offerings. Secondly, check RedBooks.com for specific review materials.
5. Schedule the exam at 2test.com. If your schedule permits, request an early morning appointment (scores tend to be higher during that period).
6. Arrive early for the appointment. Try to relax.

7. If you are not familiar with prometric testing, use the tutorial. It is free and does not count toward your time on the test.

8. Once into the exam, answer each question as though asked by a trusted friend. Read the questions carefully, but do not over think the questions.

9. Keep an eye on the time remaining and the number of remaining questions. If you start to run short of time, guess at all remaining questions. Blanks are always incorrect.

10. Most candidates finish before time expires. If you wish to review the questions, do so only once and change only those that are clearly incorrect.

11. When you have completed the single review, close the test and you will receive your score.

The three most common reasons for failure:

1. Lack of knowledge. You will not learn the topics in the test center.

2. Over thinking the questions. There is a single correct answer and three plausible but incorrect answers.

3. Over review. Many failures are caused by candidates changing too many answers when they are stressed by the exam.

You are allowed to take a test twice in a 30-day period.

Sources for Competitive Marketing Information

IBM maintains information about competing products on the IBM COMP Website and in the sales kits found on Partner-

More on the Web

- IBM "Comp" Website
- IBM PartnerWorld

World. You can access a searchable set of reports/presentations/quick reference cards about the marketplace, competitors, and competitive products. You will find materials developed by IBM as well as outside sources such as Gartner, IDC, DH Brown, IDEAS International, etc.

You can also sometimes find "product-to-product comparison" information. Explore the links in the "More on the Web" box for competitive information.

Sales Kits for System Storage

Sales kits provide business partners with a package of key client-ready sales and marketing enablement resources. You'll find client-ready presentations and brochures, education resources and opportunities, seller guides, client references and more, all to help you unleash your selling potential and the power of our unique technologies (see the "More on Web" box).

More on the Web

- Listing of all System Storage sales kits

Sales Plays

Sales Plays are designed to help you generate new selling opportunities. Each play focuses on a set of common client pain points and recommends specific solutions to address them.

Find everything you need to know about the latest System Storage sales plays and initiatives—with a special focus

on the small and midsize market. Download the "reasons of call," proposal letters, presentations, benchmarks, and sales tools to help you identify, progress, and close deals. Find tips for increasing deal size with services and relevant financing to improve your odds of winning the sale.

More on the Web

- Storage selling tools

WebCollage

IBM Business Partners that market and sell IBM servers, storage, workstations, services, and software can improve their Web presence for FREE by leveraging syndicated Web content from IBM.com to their own Websites. IBM has teamed with WebCollage, Inc. to provide the capability for Premier, Advanced, and Member level PartnerWorld participants to receive Web content dynamically delivered to their Websites.

More on the Web

- WebCollage and demo

Attach Connector Cross-Selling Tool

Attach Connector is designed to super-size your sales by helping you sell more IBM hardware, software, and services with each sales opportunity. This cross-selling tool carefully walks you through a sale by providing the right questions to ask to uncover new opportunities and deliver more complete solutions. As you select an IBM point product, a list

More on the Web

- Attach Connector cross-selling tool

of most common attach elements is suggested. The tool also provides key play opportunities where you can pass discounts and promotions to clients, as well as the IBM Competitive Advantage—why IBM over other specific companies.

When you buy a suit, a salesman will undoubtedly ask if you want a shirt and tie. Likewise, when we sell servers, we want to ask if the client wants storage, software, or services because underneath every product sale there is a much larger cross-brand opportunity. Attach Connector helps sales reps mine that larger deal by showing natural product pairings to roll your own custom solution.

Tivoli Opportunity Maximizer (TOM) Tool

The IBM Tivoli Opportunity Maximizer (TOM) tool provides another easy way to uncover and identify new opportunities to cross-sell Tivoli products and maximize revenue from your new and existing customer base. This tool walks you through the process of identifying complementary products based on your customer's current needs and provides a sales scenario for each recommended cross-sell opportunity.

More on the Web

- Tivoli Opportunity Maximizer tool

IBM System Clothing Pointers

Whenever you are proposing the sale of a server, it only makes sense to include the needed storage devices in the original proposal. Selling storage solutions with servers is known as "clothing." Clothing the servers with storage solu-

More on the Web

- Compatibility/interoperability info for IBM storage products
- Storage products for Power Systems
- Storage products for System x and BladeCenter servers
- Storage products for System z servers
- Storage products for Sun
- Storage products for HP
- Storage software for managing the information infrastructure

tions is a proven key to selling success. Follow the links in the "More on the Web" box to see what storage devices to propose with each type of server.

IBM Global Financing

IBM Global Financing (IGF) continues to focus on meeting customer needs by concentrating on key business areas: leasing and lending, remarketing and refurbishing, and asset management. IGF conducts business in more than 40 countries, financing IBM and non-IBM hardware, software, and services, with a full range of flexible, low-rate offerings. IGF's customers find that financing their information technology solutions offers many advantages in both robust and difficult economic climates, because financing frees up their capital for other investments.

More on the Web

- IBM Global Financing
- Rapid Online Financing

Many information technology installations, including those for

customer relationship management, data mining, and e-business require a substantial investment. IGF financing enables customers to pay for their new technology in affordable monthly payments during the life of the project. Our customers run the gamut from the smallest, family-owned business purchasing a single server and software to the largest, multinational corporation, acquiring tens of thousands of PCs for offices on several continents.

In addition to working directly with customers, we work with IBM Business Partners to provide financing for their clients and to help them build their own businesses. This includes a full suite of commercial financing offerings to support inventory, accounts payable and receivable financing needs, and state-of-the-art online tools, such as Rapid Online Financing, which allows partners to request quotes and deliver ready-to-sign financing contracts in under one hour.

Why should business partners offer financing? Offering financing enhances your selling efforts and allows you to:

- Facilitate closing the entire solution without scaling back
- Close deals faster by overcoming budget issues
- Decrease discounting by making payments more affordable
- Differentiate your solutions from the competition
- Lock in future sales with upgrades and end-of-lease options

Financing can be beneficial to a partner's overall business in the following ways:

- Receive payment from IBM Global Financing faster than you would with a cash purchase (free up cash to fund your growth)
- Create an opportunity to receive an incentive for selling financing
- Eliminate client credit risk—IBM Global Financing assumes the risk
- Your firm can use our "rate buy-down" capability to offer below-market financing rates on your own solutions to avoid discounting, keeping your "street price" whole.

Systems Advisor Tool

Follow the links in the "More on the Web" box to explore the IBM Systems Advisor tool. This is invaluable in helping you define specific solutions that include servers and storage products.

More on the Web

- Systems Advisor tool
- More sizing guides and configuration tools

IBM Business Value Analyst Tool

The IBM Business Value Analyst tool enables IBM Business Partners to articulate the return on investment of IBM solutions. The tool can be used with CIOs, IT leads, and LOB executives to make financial

More on the Web

- IBM Business Value Analyst tool

business cases for IBM products, both as individual products and/or solutions.

What Are "IBM Express Advantage" Offerings?

IBM Express Advantage Offerings are a key component of IBM's strategy for serving the IT opportunity in the mid-market sector. These easy-to-run and scalable hardware, middleware, services, and financing solutions are designed and priced for midsize businesses (less than 1,000 employees).

Each IBM Express Advantage Offering must meet a stringent set of technical and go-to-market criteria in order to qualify. Business partners can be confident in selling or building solutions with IBM products that are easy to acquire, easy to implement, and easy to maintain.

More on the Web

- IBM Express info on PartnerWorld
- Express Seller Toolkit info on PartnerWorld
- Built on IBM Express Advantage Offerings

You can already benefit from the features and functions of Express Advantage Offerings to build solutions that meet the real-life, specific needs of your clients at a price they can afford.

What is Storage Virtualization?

Storage virtualization is technology used to insulate the details of a storage infrastructure (hardware and software) from the applications and users who use that storage infrastructure. By doing so, storage virtualization reduces cost and complexity.

IBM has a broad range of storage virtualization offerings including the SAN Volume Controller, Virtualization Engines, Virtual File Manager software, and more. Follow the "More on the Web" links for more specifics on storage virtualization.

More on the Web

- IBM Storage Virtualization info on IBM.com
- Storage Virtualization concepts on Wikipedia

Technical Support for Business Partners

Technical Sales Support from IBM provides business partners with extensive pre-sales support through the PartnerWorld program online via the Web and by voice. Voice support can be accessed via PartnerWorld Contact Services, the single point of entry to all key support organizations. PartnerWorld Contact Services provides access to Techline for hardware and software technical sales support, and to Competeline (Americas only) for win strategies and competitive information. CompeteCenter (Europe only) is accessed through the CompeteCenter Website. Systems business partners entitled through the PartnerWorld program have access to IBM System x and IBM System Storage solutions and selected major competitive platform support including:

More on the Web

- Contact Techline
- Technical Sales Library
- PartnerWorld technical resources & support
- PartnerWorld contact services
- CompeteCenter

- Remote solution design assistance/review
- Technical marketing assistance
- Product and promotion information
- Configuration assistance
- Competitive product information
- Sales strategy information
- Solution assurance assistance.

Follow the links in the "More on the Web" box to access Technical Sales Support online (region selectable).

Hardware Configurator

The IBM Hardware Configurator is an integral part of IBM's Web-based shopping (e-commerce) offering. It enables online configuration of IBM products and services, provides detailed compatibility checking, provides key information such as price and availability that can affect selection decisions, and provides intelligent feedback and assistance related to configuration selections. It also serves as the after-market engine for identifying upgrade accessories and parts. The IBM Hardware Configurator can translate configuration results from type model features (TMFs) to the "best match" configuration in part numbers. In addition, you can start a TMF configuration from a part number.

More on the Web

- Hardware Configurator

4

System Storage Quick Reference

In this chapter, we explore the IBM System Storage hardware, software, and packaged solutions you will be selling and offer some resources that will help you succeed.

More on the Web

- System Storage product guide

Disk Storage

The IBM System Storage family includes a variety of disk storage products ranging from direct-attached disk drives to complete enterprise storage systems. In this section, we look at the product offerings in the disk storage arena.

Disk Storage Cross Reference by Workload Size

It is often a mistake to associate entry-level, midrange, and enterprise-class storage products with small, medium, and large size businesses respectively. For example, did you know that 30 percent of DS8000s are used by small and medium businesses? Did you know that 70 percent of SAN Volume Controllers are used by small and medium businesses?

Conversely, did you know that nearly every large enterprise uses entry-level and midrange storage products in addition to enterprise-class devices? For example, some large enterprises have branch offices or remote areas where

smaller storage systems are more appropriate. Measurements often used to classify business size, such as the number of employees or sales revenue, do not always correlate with the amount of information those businesses store. For this reason, product recommendations based on workloads often make more sense, though they still should be considered only as general guidelines. In this section, you will find a list of disk storage products organized by workload size (entry, midsize, and enterprise) to help you find the best solution for your client.

Disk Storage for Entry-Level Workloads

Here is a list of disk storage products designed for businesses with entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

More on the Web

- Disk storage for entry-level workloads

DS3200 Express

DS3300 Express

DS3400 Express

EXP3000 Expansion Enclosure

N3700

Disk Storage for Midsize Workloads

Here is a list of disk storage products designed for midsize workloads. Click on the links and you will jump to the section of this ebook that describes the product.

More on the Web

- Disk storage for midsize workloads

DS3950 Express

DS4700 Express

DS4800

DS5000

DS5020 Express

EXP810

EXP3000 Expansion Enclosure

Disk Storage for Enterprise Workloads

Here is a list of disk storage products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

More on the Web

- Disk storage for enterprise workloads

DS6000

DS8000

XIV Storage System

DS3000 series

Designed to deliver high availability, reliability, and scalability at a breakthrough price, the IBM System Storage DS3000 family of storage systems provides an exceptional solution for workgroup storage applications such as email, file, print, and Web servers, as well as collaborative databases and remote boot for diskless servers. In this section, we take a look at the DS3000 series. Appendix A provides a useful DS3000 part number/model/feature cross-reference.

More on the Web

- DS3000 interoperability matrix
- DS3000 sales kit

DS3200 Express

The IBM System Storage DS3200 (Figure D.1) combines next-generation SAS technology with time-proven architecture for external storage and an intuitive management interface to create a robust, flexible, and scalable storage system ideally suited for small and medium businesses (SMBs) and remote offices. By moving storage outside the server and consolidating storage across several servers, businesses can increase the capacity, management efficiency, and availability of their data solution.

The IBM System Storage DS3000 Storage Manager software is designed to provide a friendly user interface from setup to administration. This intuitive software builds on generations of IBM software development to provide trusted and reliable data management. Its task-based user interface helps to significantly reduce the complexity of installation, configu-

Specifications

Models	1726-21X—single controller 1726-22X—dual active controllers 1726-22T—dual active controllers telco
Cache per controller	512 MB battery-backed cache with 1 GB upgrade option
Host interface	1 or 3 host ports/controller, 3 Gbps Serial Attached SCSI
Supported drives	3 Gbps SAS: 73 GB, 146 GB, 300 GB, and 450 GB SAS drives at 15,000 rpm speeds; 400 GB SAS disk drives at 10,000 rpm speeds 3 Gbps SATA: 500 GB, 750 GB, and 1.0 TB SATA drives at 7,200 rpm speed
RAID levels	RAID 0, 1, 3, 5, 6, 10 (1+0)
Storage partitions	4 (std) and 8, 16, or 32 (optional feature)
Maximum drives supported	48 SAS or SATA disk drives (using three EXP3000 expansion units)
FlashCopy	2 std per storage system (up to 4 or 8 per volume and 64 per storage system optional) Volume Copy optional
Fans & power supply units	Dual-redundant, hot-swappable
Rack support	19” industry-standard rack
Management software	IBM System Storage DS3000 Storage Manager
Warranty	Three-year limited warranty on parts and labor

- DS3200 Express details on PartnerWorld
- DS3200 Express details on IBM.com
- DS3200 Express competitive info on COMP

Figure D.1. IBM System Storage DS3200 Express at a glance (and links to more detail).

ration, and management. With this approach, even non-storage savvy administrators can quickly set up and deploy their storage solution with minimal effort.

With SAS host-interface technology, up to three servers can be directly attached to a single DS3200 storage system redundantly ensuring high availability and simplicity. The DS3200 also supports up to 14 servers within an IBM BladeCenter using the BladeCenter SAS Connectivity Module for data access and boot support.

Tiered storage is the assignment of different categories of data to different types of disk drives in order to reduce total storage cost. A key attribute of the DS3000 series of disk systems is the integration of SAS and SATA technologies within a single enclosure. This simplifies purchasing and storage deployment with nearline applications using inexpensive SATA disk drives and highly-utilized applications deploying SAS disk drives.

Here are some quick DS3200 facts:

- One or three 3 Gbps SAS host connections per controller
- One 3 Gbps SAS drive interface for capacity expansion per controller
- Easy to deploy and manage with the DS3000 Storage Manager—ideal for inexperienced and/or part-time administrators
- Combination of 12 SAS or SATA 3.5” disk drives per enclosure
- Expandable by attaching up to three EXP3000s, a total of 21.6 TB of storage capacity with 450 GB SAS disk drives or up to 48.0 TB with 1.0 TB SATA disk drives

- Affordable for the SMB and entry-level budgets
- High availability features—Dual-active RAID controllers, redundant hot-swappable components, online automated I/O path failover, and unlimited global hot spares
- Solution for IBM System x, IBM BladeCenter, and select third party servers
- Telco model supports -48 V dc power supplies
- NEBS and ETSI compliance for AC and DC models
- RAID data protection—redundant I/O paths and components, hot spares
- Shared-storage benefits—consolidation, single management, increased efficiencies within the IT infrastructure.

DS3300 Express

The IBM System Storage DS3300 (Figure D.2) is designed to simply and cost-effectively meet the availability and consolidation needs for a wide range of users—from the entry-level SMB to an enterprise organization's remote sites or departments. The DS3300 provides organizations an affordable, reliable, and scalable storage solution that takes advantage of their current IP infrastructure equipment and in-house expertise. And as iSCSI is a routable transport with virtually no distance limitations, the DS3300 can extend its scope well beyond the corporate data center to remote locations as well.

Specifications

Models	1726-31X—single controller 1726-32X—dual active controllers 1726-32T—dual active controllers Telco
Cache per controller	512 MB battery-backed cache with 1 GB upgrade option
Host interface	1 or 3 host ports/controller, 3 Gbps Serial Attached SCSI (SAS); One 3 Gbps SAS drive interface for capacity expansion per controller
Supported drives	3 Gbps SAS: 73 GB, 146 GB, 300 GB, and 450 GB SAS drives at 15,000 rpm; 400 GB SAS disk drives at 10,000 rpm: 3 Gbps SATA: 500 GB, 750 GB, and 1.0 TB SATA disk drives at 7,200 rpm
RAID levels	RAID 0, 1, 3, 5, 6, 10 (1+0)
Storage partitions	4 (standard), and 8, 16, or 32 as advanced optional features
Maximum disk drives supported	48 SAS or SATA disk drives (using three EXP3000 expansion units)
Fans & power supply units	Dual-redundant, hot-swappable
Rack support	19” industry-standard rack
Management software	IBM System Storage DS3000 Storage Manager
Warranty	Three-year limited warranty on parts and labor

- DS3300 Express details on PartnerWorld
- DS3300 Express details on IBM.com
- DS3300 Express competitive info on COMP

Figure D.2. IBM System Storage DS3300 Express at a glance (and links to more detail).

The IBM System Storage DS3000 Storage Manager software is designed to provide a friendly user interface from setup to administration. This intuitive software builds on generations of IBM software development to provide trusted and reliable data management. Its task-based user interface helps to significantly reduce the complexity of installation, configuration, and management. With this approach, even non-storage savvy administrators can quickly set up and deploy their storage solution with minimal effort.

Here are some quick DS3300 facts:

- Two 1 Gbps iSCSI host connections per controller
- One 3 Gbps SAS drive interface for capacity expansion per controller
- Affordable, reliable, and well-understood IP SAN storage
- Easy to deploy and manage with the DS3000 Storage Manager—ideal for inexperienced and/or part-time administrators
- Combination of 12 SAS or SATA 3.5” disk drives per enclosure
- Expandable by attaching up to three EXP3000s, a total of 21.6 TB of storage capacity with 450 GB SAS disk drives or up to 48.0 TB with 1.0 TB SATA disk drives
- Affordable for the SMB, entry-level, and enterprise remote site and department budgets

- High availability features—Dual-active RAID controllers, redundant hot-swappable components, online automated I/O path failover, and unlimited global hot spares
- Shared-storage benefits—consolidation, single management, and increased efficiencies within the IT infrastructure
- Solution for IBM System x, IBM BladeCenter, and select third party servers
- Telco model supports -48 V dc power supplies
- NEBS and ETSI compliance for AC and DC models.

DS3400 Express

The IBM System Storage DS3400 (Figure D.3) allows a business to consolidate and share data within a direct-attach or FC SAN solution. The DS3400 adds front-end 4 Gbps FC technology to IBM time-proven architecture for enterprise-class storage. With FC host connectivity and SAS back-end technology, the DS3400 is designed to improve productivity through data consolidation, availability, performance, and scalability for a wide range of organizations.

The IBM System Storage DS3000 Storage Manager software is designed to provide a friendly user interface from setup to administration. This intuitive software builds on generations of IBM software development to provide trusted and reliable data management. Its task-based user interface helps to significantly reduce the complexity of installation, configuration, and management. With this approach, even non-stor-

Specifications

Models	1726-41X—single controller 1726-42X—dual active controllers 1726-42T—dual active controllers Telco
Cache per controller	512 MB battery-backed cache with 1 GB upgrade option
Host interface	1 or 3 host ports per controller, 3 Gbps Serial Attached SCSI (SAS) One 3 Gbps SAS drive interface for capacity expansion per controller
Supported drives	3 Gbps SAS: 73 GB, 146 GB, 300 GB and 450 GB SAS drives at 15,000 rpm speeds. 400GB SAS disk drives at 10,000 rpm speeds 3 Gbps SATA: 500 GB, 750 GB, and 1.0 TB SATA disk drives at 7,200 rpm speed
RAID levels	RAID 0, 1, 3, 5, 6, 10 (1+0)
Storage partitions	4 std (8, 16, or 32 optional)
Maximum drives supported	48 SAS or SATA drives (using three EXP3000 Expansion Units)
FlashCopy	2 std per storage system (up to 4 or 8 per volume and 64 per storage system optional) Volume Copy optional
Fans & power supply units	Dual-redundant, hot-swappable
Rack support	19” industry-standard rack
Management software	IBM System Storage DS3000 Storage Manager
Warranty	Three-year limited warranty on parts and labor

- DS3400 Express details on PartnerWorld
- DS3400 Express details on IBM.com
- DS3400 Express competitive info on COMP

Figure D.3. IBM System Storage DS3400 Express at a glance (and links to more detail).

age savvy administrators can quickly set up and deploy their storage solution with minimal effort.

Here are some quick DS3400 facts:

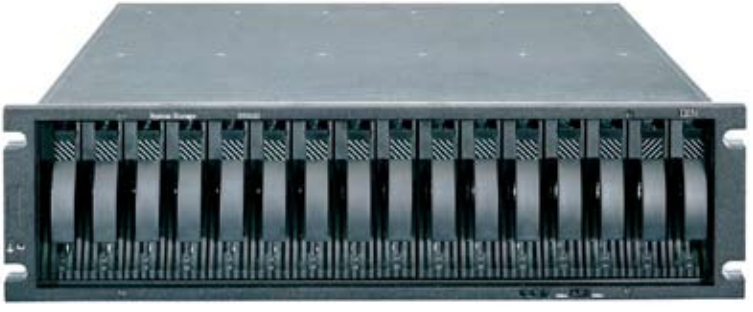
- 4 Gbps Fibre Channel (FC) interface technology
- One 3 Gbps SAS drive interface for capacity expansion per controller
- Direct-attach storage (DAS) or SAN solution—Start with a DAS configuration and seamlessly transition to an FC SAN when ready
- Easy to deploy and manage with the DS3000 Storage Manager—ideal for inexperienced and or part-time administrators
- Combination of 12 SAS or SATA 3.5” disk drives per enclosure
- Expandable by attaching up to three EXP3000s, a total of 21.6 TB of storage capacity with 450 GB SAS disk drives or up to 48.0 TB with 1.0 TB SATA disk drives
- Affordable for the SMB, entry-level, and enterprise remote site and department budgets
- High availability features—Dual-active RAID controllers, redundant hot-swappable components, online automated I/O path failover, and unlimited global hot spares
- Shared-storage benefits—consolidation, single management, and increased efficiencies within the IT infrastructure
- Solution for IBM System x, IBM BladeCenter, and select third party servers

- Telco model supports -48 V dc power supplies
- NEBS and ETSI compliance for AC and DC models.

DS3950 Express/EXP395

The IBM System Storage DS3950 Express (Figure D.4) is designed to provide lower total cost of ownership, high performance, robust functionality, and unparalleled ease of use. Facing relentless data growth and shrinking budgets, companies continue to look for ways to reduce costs through efficiencies. The high-performance 8 Gbps capable Fibre Channel connections offered by the DS3950 allow companies to reduce the number of HBAs per server and the number of overall ports in their FC SAN infrastructure without sacrificing performance, thus saving acquisition and operational costs. Additionally, the DS3950's auto-negotiating 8 Gb/s Fibre Channel interfaces allow it to seamlessly integrate into an existing 2 Gb/s or 4 Gb/s infrastructure, while providing the buyer with investment protection going forward when the SAN inevitably becomes 8 Gb/s.

The DS3950's design avoids over-configuration for an affordable entry-point while offering seamless "pay-as-you-grow" scalability as requirements change. Its efficient storage utilization lowers raw capacity requirements, and support for intermixing high performance and high capacity drives enables enclosure-based tiered storage. These unique capabilities reduce the number of drives needed to meet performance and/or capacity demands—lowering acquisition and operational expenditures. The DS3950 is not available in the U.S., Canada, or China.



Specifications

Model	94	98
Form factor	3U rack-mountable enclosure with 16-drive bays	3U rack-mountable enclosure with 16-drive bays
Cache memory	2 GB cache memory (1 GB per RAID controller)	4 GB cache memory (2 GB per RAID controller)
Storage partitions	Two storage partitions enabled	Two storage partitions enabled
RAID controllers	Dual-intelligent	Dual-intelligent
Host ports	Four 8 Gbps Fibre Channel	Four 8 Gbps Fibre Channel
Drive expansion ports	Four 4 Gbps Fibre Channel	Four 4 Gbps Fibre Channel
Power supplies	dual redundant cooling	dual redundant cooling

- DS3950 Express details on PartnerWorld
- DS3950 Express details on IBM.com
- DS3950 Express competitive info on COMP
- DS3950 Sales Kit on PartnerWorld

Figure D.4. IBM System Storage DS3950 Express at a glance (and links to more detail).

Here are some quick DS3950 facts:

- Next-generation 8 Gbps FC interfaces enable infrastructure simplification
- Mixed host interfaces support (FC/iSCSI) enables SAN tiering
- Balanced performance well-suited for virtualization/consolidation
- Reduces the cost of consolidation
- Support for intermixing FC/SATA drives enables cost effective tiered storage
- Trusted storage that protects and delivers your data when needed
- Flexibility to address a wide range of storage needs
- Feature-rich management software that maximizes utilization and minimizes storage TCO
- Designed to support future product enhancements
- Key application certifications ensure confidence
- Centrally manage the DS series with the IBM System Storage DS Storage Manager
- Support up to 112 disk drive modules with the attachment of six EXP395 expansion units.

EXP3000 Expansion Enclosure

The IBM System Storage EXP3000 Expansion Enclosure is a high-density 2U, 19-inch rack mount driven closure designed

for supporting up to a total of twelve 3.5-inch SAS and/or SATA disk drives. Robust and flexible, the EXP3000 Expansion Enclosure is offered as an expansion enclosure behind the DS3000 series of storage systems including the DS3200, DS3300, and DS3400. The EXP3000 can also be uitlized as a direct-attach solution for IBM System x servers with support of MegaRAID or ServeRAID host bus adapters.

Multiple EXP3000s can be connected to expand capacity and help address storage needs for today and tomorrow. The addition of solid state drives (supported with EXP3000 when attached to MegaRAID and ServeRAID only) presents an opportunity to simplify local storage infrastructure to help maintain overall maintenance and cooling cost, while considering remote storage solutions for end-to-end data availability as part of a System x ecosystem.

More on the Web

- EXP3000 info on PartnerWorld
- EXP3000 info on IBM.com

Solid state drives are an appropriate solution for local OS booting, high performance input/output applications, and some local storage space. Increasingly, solid state storage may be a practical component in balancing data center costs, reliability, and manageability.

Here are some quick EXP3000 Express facts:

- 3 Gbps SAS disk drive expansion technology
- Support for up to 5.4 TB (with 450 GB SAS disk drives) or up to 12 TB (with 1.0 TB SATA disk drives) in a single enclosure

- SAS or SATA disk drive intermix supported with select IBM System x, IBM System p, and IBM BladeCenter servers using the DS3000 series of storage systems, MegaRAID, or ServeRAID host bus adapters

- 50 GB SATA Solid State Disk drive supported in EXP3000 expansion units that are directly attached to System x servers via the ServeRAID MR10M SAS/SATA controller adapter installed in the System x server

- Three EXP3000s can be attached to a DS3000 storage system to expand up to 21.6 TB of physical storage capacity when utilizing 450 GB SAS disk drives or 48.0 TB of physical storage capacity when utilizing 1 TB SATA disk drives

- Telco model supports -48 V dc power supplies

- NEBS and ETSI compliance for AC and DC models.

DS3000 series Warranty, Maintenance, and Service

The standard warranty that is included with the purchase of a DS3000 series is a limited three years parts and labor. You can learn more details in the document "All About DS4000 Warranty, Maintenance and Service Guide." Yes... it is the same for both the DS3000 and the DS4000 families.

More on the Web

- DS4000 warranty, maintenance, and service guide

DS3000 series Competitive Marketing

Follow the "More on the Web" link to see the latest resources to help you overcome the competition when selling the DS3000 series.

More on the Web

- DS3000 competitive info on COMP

DS4000 series

The IBM System Storage DS4000 series consists of midrange rack-mountable storage devices that can be used in multiple operating environments (Microsoft Windows, Netware, Linux, and UNIX). In this section, we take a look at the DS4000 series. Appendix B provides a useful DS4000 part number/model/feature cross-reference.

More on the Web

- DS4000 interoperability matrix
- DS4000 Storage Manager details on PartnerWorld
- DS4000 sales kit

DS4700 Express

The DS4700 Express (Figure D.5) offers high-performance 4 Gbps capable Fibre Channel connections, up to 112 TB of physical storage capacity with 112 1 TB SATA disk drives, and powerful system management, data management, and data protection features. The DS4700 Express is designed to expand from workgroup to enterprise-wide capability with the attachment of six DS4000 EXP810 disk enclosures. The DS4700 Express DC Models are NEBS-3 compliant storage systems designed to be powered from a -48 volt DC Telco industry-standard power source. The DS4700 Express

Specifications

Model	1814-70A/H/S, 1814-72A/H/S 1814-70S, 1814-72S (DC power supplies)
RAID controller	Dual active
Cache	Model 70A/70S: 2 GB; Model 72A/72S: 4 GB battery-backed
Host interface	8 host ports model 72, 4 host ports model 70—Fibre Channel Switched (FC-SW) and FC Arbitrated Loop (FC-AL) standard, Auto-sensing 1 Gbps/2 Gbps/4 Gbps
Drive interface	4 drive ports—4 Gbps Fibre Channel (FC) auto-sensing 2 Gbps/4 Gbps
Supported drives	Supports 4 Gbps FC: 15K – 450 GB, 300 GB, 146.8 GB, 73.4 GB, 36.4 GB E-DDM Supports 4 Gbps SATA: 7.2K - 1 TB, 750 GB, 500 GB (E-DDM)
RAID levels	0, 1, 3, 5, 6, 10
Storage partitions	4, 8, 16, 64, or 128 storage partitions
Maximum drives supported	Model 72A/H/S: 112 FC or 112 SATA drives (using 6 DS4000 EXP810 Expansion Units) Model 70A/H/S: 112 FC or 112 SATA drives (using 6 DS4000 EXP810 Expansion Units)
Fans and power supplies	Dual-redundant, hot-swappable
Rack support	19” industry-standard rack
Management software	IBM System Storage DS Storage Manager
SAN support	Supported IBM FC switches and directors (product numbers 2005, 2006, 2109, 2026, 2027, 2031, 2032, 2034, 2042, 2054, 2061, and 2062, and IBM BladeCenter)

- DS4700 details on PartnerWorld
- DS4700 details on IBM.com
- DS4700 competitive info on COMP

Figure D.5. IBM System Storage DS4700 Express at a glance (and links to more detail).

is available in a 3U high enclosure and mounts in a 19-inch rack-mount package.

The IBM DS4000 series has a history of flexibility that helps manage growth. The DS4700 Express builds on that history with drive options that help manage complexity. And the increased data protection of the DS4700 helps manage risk.

The IBM System Storage DS4700 Express Model supports a high-performance 4 Gbps capable Fibre Channel interface designed for data-intensive applications that demand increased connectivity. The DS4700 Express supports eight 4 Gbps capable host channels that may be directly attached to host servers or connected to a Fibre Channel storage area network (SAN). Four Gbps capable drives and IT infrastructure are required to achieve 4 Gbps capable throughput speeds.

There are two ways to measure the performance of a SAN device: Megabytes per second (MBps) and input/output per second (IOPS). The DS4700 Express 4 Gbps SAN solution is designed to provide up to 1550 MBps throughput (assuming a 4 Gbps capable system) with up to 120,000 IOPS. A 2 Gbps storage array can require up to twice as many host ports as a 4 Gbps array to deliver the throughput of four 4 Gbps ports. The DS4700 Express can help you free up or eliminate the need for additional host ports in the SAN for each array.

Here are some quick DS47000 Express facts:

- End-to-end 4 Gbps capable Fibre Channel interface technology to help optimize performance
- Up to 1550 MBps bandwidth for high throughput applications

- Intermix of Fibre Channel and SATA hard disk drives supported in the EXP810 storage expansion unit
- Includes IBM System Storage DS Storage Manager to help centrally manage the DS4000, DS5000, and DS3000 series
- Eight total host channels with dual controllers for increased connectivity
- Support for up to 112 disk drive modules with the attachment of six DS4000 EXP810 Expansion Units
- NEBS-3 compliant designed to be powered from a -48 V dc Telco industry-standard power source
- Eight total host channels with dual controllers for increased connectivity
- Support for up to 112 disk drive modules with the attachment of six DS4000 EXP810 Expansion Units
- NEBS-3 compliant designed to be powered from a -48 V dc Telco industry-standard power source.

DS4800

The IBM System Storage DS4800 disk storage system (Figure D.6) supports a high-performance 4 Gbps Fibre Channel interface for increased host connectivity to deliver necessary bandwidth for high-throughput applications. It is designed for data-intensive applications that demand increased connectivity provided by eight 4 Gbps host channels designed to provide up to 1720 MBps of sustained bandwidth for high-throughput applications through the eight channels directly

Specifications

Model	1815-80A, 1815-82A
RAID controller	Dual active
Cache	Model 80: 4 GB, Model 82A
Host interface	8 host ports—Fibre Channel Switched (FC-SW) and FC Arbitrated Loop (FC-AL) standard, auto-sensing 1 Gbps/2 Gbps/4 Gbps
Drive interface	8 drive ports—4 Gbps Fibre Channel (FC), auto-sensing 2 Gbps/4 Gbps
Supported drives with expansion units	4 Gbps SATA: 7.2K rpm, 1 TB, 750 GB, and 500 GB; 2 Gbps FC: 15K rpm, 146 GB, 73 GB, 36 GB (E-DDM); 4 Gbps FC: 15K rpm, 450 GB, 300 GB, 146 GB, 73 GB, 36 GB (E-DDM) 750 GB, and 500 GB; 2 Gbps FC: 15K rpm, 146 GB, 73 GB,36 GB (E-DDM); 2 Gbps FC: 10K rpm, 300 GB,146 GB, 73 GB (E-DDM); 4 Gbps FC: 15K rpm, 450 GB, 300 GB,146 GB,73 GB,36 GB (E-DDM)
RAID levels	0, 1, 3, 5, 10
Storage partitions	8, 16, 32, 128, 256 or 512 storage partitions
Maximum drives supported	Model 80A: 224 drives, Model 82A: 224 drives,
Fans and power supplies	Dual-redundant, hot-swappable
Rack support	19” industry-standard rack
Management software	IBM System Storage DS Storage Manager
SAN support	Supported IBM FC switches and directors (product numbers 2005, 2006, 2109, 2026, 2027, 2031, 2032, 2034, 2042,

- DS4800 details on PartnerWorld
- DS4800 details on IBM.com
- DS4800 competitive info on COMP

Figure D.6. IBM System Storage DS4800 at a glance (and links to more detail).

attached to the host servers or connected to a Fibre Channel storage area network (SAN).

The IBM System Storage DS4800 disk storage system offers customers a 4 Gbps SAN solution to take advantage of the performance offered by 4 Gbps technology. There are two ways to measure performance of a SAN device: Megabytes per second (MBps) and input/output per second (IOPS). The IBM DS4800 4 Gbps SAN product has very impressive performance numbers. It is designed to offer up to 1720 MBps throughput with up to 575,000 IOPS. A 2 Gbps storage array can require up to twice as many host ports as a 4 Gbps array to deliver the throughput of four 4 Gbps ports. This frees up ports in the SAN for each array.

Here are some quick DS4800 facts:

- 4 Gbps Fibre Channel interface technology
- Up to 1720 MBps bandwidth for high-throughput applications
- Intermix of Fibre Channel and SATA hard disk drives supported in the EXP810 storage expansion unit
- Includes IBM System Storage DS Storage Manager to help centrally manage the DS4000, DS5000, and DS3000 series
- Eight host channels for increased connectivity
- Supports intermix of EXP810, EXP710, and EXP100.

EXP810 Storage Expansion Unit

The DS4000 EXP810 is the latest disk drive enclosure in the DS4000 series of products. This 3U enclosure has 4 Gbps

Fibre Channel (FC) interfaces and supports up to 16 disk drives.

The 4 Gbps ready IBM System Storage EXP810 Storage Expansion Unit machine type (1812-81A) offers a new 16-bay disk enclosure for attachment to selected DS4000 Mid-range Disk Systems, with up to 16 Terabytes (TB) physical capacity per expansion unit using sixteen 1 TB SATA disk drives. The EXP810 Storage Expansion Unit is designed to accommodate 2 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), as well as 4 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), or 4 Gbps Serial ATA Enhanced Disk Drive Modules (E-DDM). Supports redundant AC or DC power and cooling modules, and ESM interfaces. The DS4000 EXP810 is available in a 19-inch rack mount package.

More on the Web

- EXP810 info on PartnerWorld
- EXP810 info on IBM.com

DS4000 series Warranty, Maintenance, and Service

The standard warranty that is included with the purchase of a DS4000 series is three years parts and labor. You can learn more details in the document "All About DS4000 Warranty, Maintenance, and Service Guide."

More on the Web

- DS4000 warranty, maintenance, and service guide

DS4000 Competitive Marketing

Follow the "More on the Web" link to see the latest resources to help you overcome the competition when selling the DS4000 series.

More on the Web

- DS4000 competitive info on COMP

DS5000 series

The IBM System Storage DS5000 series storage system (Figure D.7) is designed to meet today's and tomorrow's demanding open-systems requirements while establishing a new standard for lifecycle longevity. Building on many decades of design expertise, the DS5000 series' seventh-generation architecture delivers industry-leading performance, real reliability, multidimensional scalability, and unprecedented investment protection.

The DS5000 series is equally adept at supporting transactional applications such as databases and OLTP, throughput-intensive applications such as HPC and rich media, and concurrent workloads for consolidation and virtualization. With its relentless performance and superior reliability and availability, the DS5000 series storage system can support the most demanding service level agreements (SLAs).

Here are some quick DS5000 facts:

- New seventh-generation architecture with extreme and balanced performance for increased application performance
- "Pay-as-you-grow" scalability up to 256 drives for DS5100 and 448 drives for the DS5300 for the most demanding capacity requirements

Specifications

Model	1818-51A, 1818-53A
RAID controller	Dual active
Cache	8 GB or 16 GB
Host interface	8 or 16 host ports—Fibre Channel Switched (FC-SW) and FC Arbitrated Loop (FC-AL) standard, auto-sensing 1 Gbps/2 Gbps/4 Gbps or 2 Gbps/4 Gbps/8 Gbps
Drive interface	16 drive ports—4 Gbps Fibre Channel
Supported drives with expansion units	4 Gbps SATA: 7.2 K rpm – 1 TB and 750 GB; 4 Gbps FC: 15 K rpm, 450 GB/300 GB/146 GB (E-DDM)
RAID levels	0, 1, 3, 5, 6, and 10
Storage ports	8, 16, 32, 128, 256, or 512 storage partitions
Maximum disk drives	Model 5100: 256 drives, Model 5300: 448 drives
Power supplies and fans	Dual-redundant, hot-swappable
Rack support	19” industry standard rack mountable
Management software	IBM System Storage DS Storage Manager

- DS5000 details on PartnerWorld
- DS5000 details on IBM.com
- DS5000 competitive info on COMP

Figure D.7. IBM System Storage DS5000 series at a glance (and links to more detail).

- Up to 700,000 IOPs and 6,400 MBps
- Unique host interface cards designed to provide investment protection and lifecycle longevity
- Support for self-encrypting drives secures data-at-rest
- Intermix of Fibre Channel and SATA hard disk drives supported in the EXP5000 storage expansion unit
- Designed to support high availability with dual active, hot-swappable controllers, power supplies, and many non-disruptive firmware upgrades
- Includes IBM System Storage DS Storage Manager to help centrally manage the DS5000, DS4000, and DS3000 series
- Heterogeneous support for the most common operating systems, including Microsoft Windows, UNIX, and Linux
- Architecture efficiently handles compute-intensive parity calculations, enabling exceptional disk-based performance that's ideally suited for RAID 5 and RAID 6 configurations.

DS5020 Express

The IBM System Storage DS5020 Express (Figure D.8) is designed to provide lower total cost of ownership, high performance, robust functionality, and unparalleled ease of use.

Facing relentless data growth and shrinking budgets, companies continue to look for ways to reduce costs through efficiencies. Its 8 Gb/s FC allows companies to reduce the number of HBAs per server and the number of overall ports in

Specifications

Model	1814-20A
RAID controller	Dual active
Host interface	• Four 8 Gb/s FC • or Eight 8 Gb/s FC • or Four 4 Gb/s FC and Four 1 Gb/s iSCSI
Drive interface	4 drive ports—Fibre Channel (FC) Switched and FC Arbitrated Loop (FC-AL) standard, Auto-sensing 2 Gbps/4 Gbps
Supported drives	Supports 4 Gbps FC/FDE: 15k – 450 GB, 300 GB, 146.8 GB, 73.4 GB, E-DDM Supports 4 Gbps SATA: 7.2K 500 GB/750 GB and 1 TB E-DDM Disk drives
RAID levels	0, 1, 3, 5, 6, 10
Storage partitions	4, 8, 16, 64 or 128 storage partitions
Maximum drives supported	112 FC or 112 SATA drives (using 6 EXP520 Expansion Units)
Fans and power supplies	Dual redundant, hot-swappable
Rack support	19-inch, industry-standard rack
Management software	IBM System Storage DS Storage Manager version 10.xx
SAN support	Supported IBM FC switches and directors (product numbers 2005, 2006, 2109, 2026, 2027, 2031, 2032, 2034, 2042, 2054, 2061 and 2062, and IBM BladeCenter)

- DS5020 Express details on PartnerWorld
- DS5020 Express details on IBM.com
- DS5020 Express competitive info on COMP

Figure D.8. IBM System Storage DS5020 Express at a glance (and links to more detail).

their FC SAN infrastructure without sacrificing performance, thus saving acquisition and operational costs.

Additionally, the DS5020's auto-negotiating 8 Gb/s Fibre Channel interfaces allow it to seamlessly integrate into an existing 2 Gb/s or 4 Gb/s infrastructure, while providing the buyer with investment protection going forward when the SAN inevitably becomes 8 Gb/s.

The DS5020's design avoids over-configuration for an affordable entry-point while offering seamless "pay-as-you-grow" scalability as requirements change. Its efficient storage utilization lowers raw capacity requirements, and support for intermixing high performance and high capacity drives enables enclosure-based tiered storage. These unique capabilities reduce the number of drives needed to meet performance and/or capacity demands—lowering acquisition and operational expenditures.

Here are some quick DS5020 Express facts:

- Next-generation 8 Gbps FC interfaces enable infrastructure simplification
- Mixed host interfaces support (FC/iSCSI) enables SAN tiering
- Balanced performance well-suited for virtualization/consolidation
- Reduces the cost of consolidation
- Self-encrypting drives secure data throughout your drive's lifecycle

- Support for intermixing FC/FDE/SATA drives enables cost effective tiered storage
- Trusted storage that protects and delivers your data when needed
- Flexibility to address a wide range of storage needs
- Feature-rich management software that maximizes utilization and minimizes storage TCO
- Designed to support future product enhancements
- Key application certifications ensure confidence
- Centrally manage the DS series with the IBM System Storage DS Storage Manager
- Support up to 112 disk drive modules with the attachment of six EXP520 expansion units.

EXP5000 Storage Expansion Unit

The DS5000 EXP5000 is the disk drive enclosure for the DS5000 series of products. This 3U enclosure has 4 Gbps Fibre Channel (FC) interfaces and supports up to 16 disk drives.

The 4 Gbps IBM System Storage EXP5000 Storage Expansion Unit machine type (1818D1A) offers a 16-bay disk enclosure for attachment to DS5000 Midrange Disk Systems, with up to 16 Terabytes (TB) physical capacity per expansion unit using sixteen 1 TB SATA disk drives. The EXP5000 Storage Expansion Unit is designed to accommodate 4 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), and 4 Gbps Serial

ATA Enhanced Disk Drive Modules (E-DDM). Supports redundant AC power and cooling modules and ESM interfaces. The EXP5000 is available in a 19-inch rack mount package.

DS5000 series Warranty, Maintenance, and Service

The standard warranty that is included with the purchase of a DS5000 series is one year parts and labor. You can learn more details in the document "All About DS5000 Warranty, Maintenance, and Service Guide."

DS5000 Competitive Marketing

Follow the "More on the Web" link to see the latest resources to help you overcome the competition when selling the DS5000 series.

More on the Web

- DS5000 competitive info on COMP
- DS5000 sales kit on PartnerWorld

DS6000 series

The IBM System Storage DS6000 series is an innovative storage system designed to provide high availability and high performance in a small, space-saving, power efficient modular package. This series, along with the DS8000 series, offers an enterprise-class continuum of storage systems with shared replication services and common management interfaces. The DS6000 series is well suited to help you simplify your storage infrastructure and help you manage

More on the Web

- IBM System Storage DS6000 product page
- IBM System Storage DS6000 info on PartnerWorld
- IBM System Storage DS6000 product support page

growth and complexity, as well as improve the space efficiency of your storage infrastructure.

DS6800

The IBM System Storage DS6000 series (Figure D.9) is a unique storage system designed to provide high availability and high performance in a small, space-saving, power-efficient modular package. This series, along with the DS8000 series, offers an enterprise-class continuum of storage systems with shared replication services and common management interfaces. The DS6000 series is well suited to help you simplify your storage infrastructure, and help you manage growth and complexity through consolidation of storage onto this platform. As part of the IBM System Storage DS Family, the DS6800 is designed to provide medium and large businesses with a low-cost, enterprise-class storage solution to help simplify data management and to provide comprehensive data protection and recovery capabilities and easy scalability for both mainframe and open system storage needs.

The DS6800 is designed to provide enterprise-class reliability, availability, and serviceability by orchestrating its operations dynamically to improve performance, identify problems before they occur, and take preemptive, corrective action without administrative intervention. The DS6000 series includes multi-pathing software designed to provide enhanced data availability through automatic path failover and improved performance through dynamic I/O load balancing across multiple paths.

Here are some quick DS6800 facts:

Specifications

Model	1750-522
RAID controller	Dual active
Processor	IBM Power PC 750GX 1 GHz
Cache	2 GB cache per controller 4 GB cache per system
Battery backup for cache	72 hours
Host ports	8
Host interface	Fibre Channel/FICON
Storage ports	8
Maximum disk drives supported	128 (with expansion enclosures) 16 disk drives per enclosure, including controller
Disk drive sizes	146 GB (15 K rpm) 300 GB (15 K rpm) 450 GB (15 K rpm)
Maximum physical storage capacity	57.6 TB (using all Fibre Channel disk drives)

- DS6800 details on PartnerWorld
- DS6800 details on IBM.com
- DS6800 competitive info on COMP

Figure D.9. IBM System Storage DS6800 at a glance (and links to more detail).

- Designed to deliver enterprise-class storage functionality for distributed and mainframe servers in a modular, space-saving, power-efficient, scalable package
- Provides low total cost of ownership by offering tiered pricing on software and a 24x7 IBM on-site repair warranty that covers both hardware and software
- Designed to offer a highly available, robust storage solution for medium and large enterprises
- Supports advanced copy services, which are interoperable with IBM System Storage DS8000 series and IBM TotalStorage Enterprise Storage Server
- Designed to provide over 1600 MBps performance for high throughput applications
- Includes eight host ports supporting Fibre Channel and IBM FICON connectivity
- Includes IBM DS6000 Storage Manager software that supports a Web-based intuitive interface and Express Configuration Wizards for simplified system configuration and management.

DS6000 series Warranty, Maintenance, and Service

Current models of the IBM System Storage DS6000 series, 1750-522 and 1750-EX2 include IBM installation and a one year, 24x7, IBM onsite, same-day-response warranty on both hardware and software. Additional services for maintenance, configuration, data migration, and other storage management

needs are available to help organizations optimize their storage infrastructure and choose the length of service and support that is right for their needs.

More on the Web

- DS6000 warranty information
- DS6000 warranty service upgrades and maintenance options
- DS6000 implementation services

DS6000 Competitive Marketing

Follow the "More on the Web" link to see the latest resources to help you overcome the competition when selling the DS6000 series.

More on the Web

- DS6000 competitive info on COMP

DS8000 series (DS8700, DS8300, DS8100)

The DS8000 is designed to deliver the utmost in high performance—helping organizations process, store, and retrieve data at astounding speeds. Its unique three-tier processor architecture includes market-proven IBM POWER microprocessors, an advanced, fault-tolerant internal component interconnect, switched connections to internal disks, innovative cache optimization algorithms from IBM Research, as well as lightning fast solid-state

More on the Web

- IBM System Storage DS8000 product page
- IBM System Storage DS8000 sales kit on PartnerWorld
- IBM System Storage DS8100 info on PartnerWorld
- IBM System Storage DS8300 info on PartnerWorld

drives. Moreover, with its tremendous scalability, flexible tiered storage options, broad server support, and support for advanced IBM deduplication technology, the DS8000 can help simplify the storage environment by consolidating multiple storage systems onto a single system while providing the availability and performance you've come to trust for your most important business applications.

Not only is the DS8000 designed to deliver the highest levels of balanced performance throughout the system, close collaboration with other IBM offerings across IBM's storage, server, and software portfolios yields the type of solution performance our competitors can only envy. The latest example is the close collaboration across IBM's hardware and software organizations that aims to enable clients to get more value from solid-state storage solutions by looking at how solid-state drives (SSDs) affect not just the disk system, but also the overall application environment, including servers and software. While competitors would have you believe that simply supporting SSDs in a disk system is sufficient, IBM believes that as high-end disk systems increasingly incorporate multiple tiers of drives, clients need help aligning various application workloads and their data on the appropriate drive tier, which requires insight beyond simply the disk system. IBM is there to help with smart performance analysis and data migration tools that can help clients optimize the performance and cost effectiveness of their tiered storage deployments.

DS8700 Model

The new DS8700 model (Figure D.10) introduces new IBM POWER6 server technology that enables the system to increase overall throughput over the DS8300 model by up to over 150 percent! As part of this hardware update, we've introduced a new PCI-Express internal component interconnect, which also plays a big part in the performance improvement over the existing DS8300 models. We also added faster ASICs on the device adapters, which are up to 70 percent faster than the previous adapters.

The new hardware update also offers clients the ability to non-disruptively upgrade all the DS8700's components concurrently, including the disk capacity, host adapters, disk adapters, memory, and now even the processor complexes. As such, clients can scale up from the smallest configuration to the largest configuration non-disruptively.

Another area we continue to invest in is enabling shorter service windows when clients need to upgrade microcode versions. This latest release continues that trend by reducing our concurrent code load times. We can also boast even better than five-nines availability we showed in the previous release. In fact, the DS8700 exited final testing with over 20 percent better initial quality than the previous release, which already boasted better than five-nines availability! Lastly, the new DS8700 model offers new GUI enhancements that can greatly simplify the initial configuration and ongoing management of the system.

Specifications

Models	**DS8700 (941, 94E)**
Shared SMP processor configuration	POWER6 dual 2-way or 4-way
Other major processors	PowerPC, Asics
Processor memory for cache and NVS (min/max)	32 GB/384 GB
Host adapter interfaces	4-port 4 Gbps Fibre Channel/FICON,
Host adapters (min/max)	2/32
Host ports (min/max)	4/128
Drive interface	FC-AL
Number of disk drives (min/max)	16/1024
Device adapters	Up to 16 4-port FC-AL
Maximum physical storage capacity	1024 TB
Disk sizes	73 GB solid-state drives 146 GB solid-state drives 146 GB (15,000 rpm) 300 GB (15,000 rpm) 450 GB (15,000 rpm) 1 TB (7,200 rpm)
RAID levels	5, 6, 10

- DS8700 details on PartnerWorld
- DS8700 details on IBM.com
- DS8700 competitive info on COMP

Figure D.10. IBM System Storage DS8700 series at a glance (and links to more detail).

DS8300 and DS8100 Models

The DS8300 and DS8100 models (Figure D.11) also boast the DS8000's three-tier processor architecture and switched connections to internal disks; however, they include the older generation IBM POWER5+ processors and the RIO-G internal component interconnect. The DS8700's IBM POWER6 processor and PCI-Express interconnect offer improvements in performance, reliability, and scalability beyond the capabilities of the DS8300 and DS8100.

Here are some quick DS8000 facts:

- Performance: New dual IBM POWER6-based controllers, PCI Express (Peripheral Component Interconnect Express) Generation 2 internal component interconnect, and device adapter cards enable up to over 150 percent performance improvement over previous models.
- Availability and resiliency: Greater than five-nines availability with redundant, hot-swappable components, faster concurrent microcode updates, and a steady, 10-year lineage of microcode improvements built on the IBM POWER server architecture.
- Flexibility and scalability: Clients can scale up from the smallest configuration to the largest configuration nondisruptively by upgrading drive capacity, host adapters, drive adapters, memory, and even the system's processor complexes.
- Consolidation: Manage growth and reduce operational complexity through consolidation with high-performance solid-state drives, enterprise fibre channel drives, high-capacity

Specifications

Models	**DS8100 (931)**	**DS8300 (932, 9B2)**
Shared SMP processor configuration	POWER5+ dual 2-way	POWER5+ dual 4-way
Other major processors	PowerPC, Asics	PowerPC, Asics
Processor memory for cache and NVS (min/max)	16 GB/128 GB	32 GB/256 GB
Host adapter interfaces	4-port 4 Gbps or 2 Gbps Fibre Channel/FICON, 2-port ESCON	4-port 4 Gbps or 2 Gbps Fibre Channel/FICON, 2-port ESCON
Host adapters (min/max)	2/16	2/32
Host ports (min/max)	4/64	4/128
Drive interface	FC-AL	FC-AL
Number of disk drives (min/max)	16/384	16/1024
Device adapters	Up to 8 4-port FC-AL	Up to 16 4-port FC-AL
Maximum physical storage capacity	384 TB	1024 TB
Disk sizes	73 GB solid-state drives 146 GB solid-state drives 146 GB (15,000 rpm) 300 GB (15,000 rpm) 450 GB (15,000 rpm) 1 TB (7,200 rpm)	73 GB solid-state drives 146 GB solid-state drives 146 GB (15,000 rpm) 300 GB (15,000 rpm) 450 GB (15,000 rpm) 1 TB (7,200 rpm)
RAID levels	5, 6, 10	5, 6, 10

- DS8100 details on PartnerWorld
- DS8300 details on PartnerWorld
- DS8000 details on IBM.com
- DS8000 info on COMP

Figure D.11. IBM System Storage DS8000 series at a glance (and links to more detail).

Serial ATA (SATA) drives, advanced management capabilities, support for advanced IBM deduplication technology, and thin provisioning.

- Security: Protect sensitive information from internal and external threats with innovative self-encrypting disk drives that can help address PCI-DSS (Payment Card Industry Data Security Standard) compliance requirements.
- Investment protection: Exceptional total cost of ownership with Enterprise Choice warranties of up to four years on both hardware and advanced function software, while preserving client investments in prior models with full interoperability of hard drives, drive enclosures, tools, scripts, and copy services.

DS8000 series Warranty, Maintenance, and Service

The IBM System Storage DS8000 series offers leading Enterprise Choice warranties with one, two, three, or four years with IBM installation and 24x7 IBM onsite, same-day-response on both hardware and advanced function software. Additional services for maintenance, configuration, data migration, and other storage management needs are available to help organizations optimize their storage infrastructure and choose the length of service and support that is right for their needs.

More on the Web

- DS8000 warranty options

DS8000 Competitive Marketing

Follow the "More on the Web" link to see the latest resources to help you overcome the competition when selling the DS8000 series.

More on the Web

- DS8000 competitive info on COMP

XIV Storage System

The IBM XIV Storage System (Figure X.1) is a high-end disk system designed to support key current and future business requirements for a highly available information infrastructure. Built from a grid of standard Intel/Linux components, it is connected in an any-to-any topology using Gigabit Ethernet. The ground-breaking XIV architecture delivers outstanding performance, scalability, availability, and reliability. Based on SATA disks, the XIV system applies a unique parallel architecture, caching algorithms, and more, eliminating hotspots and achieving performance levels beyond those of Fibre Channel (FC) disk-based systems. The XIV system provides a true single-tier solution. It is offered in partial and full rack configurations.

Here are some quick XIV Storage System highlights:

- A revolutionary high-end disk storage architecture designed to eliminate the complexity of administration and management of tiered storage and information lifecycle management
- Near-instantaneous and highly space-efficient snapshots provide point-in-time copies of data that consume storage capacity only per changes while maintaining high performance

Specifications

Models	2810-A14, 2812-A14
Number of disks	72/180
Number of FC ports	8/24 (4 Gbps, 2 Gbps, or 1 Gbps)
Number of iSCSI ports	0/6
Raw capacity	72/180 TB
Usable capacity	27/79 TB*
Memory	48/120 GB
Cache to disk bandwidth	240 Gbps
CPUs (quad-core)	9/21
System Software	IBM XIV Storage System Software

**After taking into account capacity used by mirroring (redundancy), spares, and metadata*

- XIV partner portal
- XIV details on PartnerWorld
- XIV sales kit on PartnerWorld
- XIV details on IBM.com
- XIV competitive info on COMP
- XIV configuration and functionality table

Figure X.1. IBM XIV Storage System at a glance (and links to more detail).

- System virtualization that greatly simplifies IT operations and optimizes performance through automatic distribution of data across system resources, avoiding hot spots without manual tuning
- High reliability achieved through unique self-healing functionality, which can enable the system to rebuild a 1 TB disk drive within 30 minutes or less, with almost no performance impact
- Optimized, consistent performance derived from the system's massive parallelism, disk utilization, and unique caching algorithms
- Amazingly intuitive user interface and system virtualization greatly simplify storage configuration and management.
- Built-in thin provisioning that can help reduce direct and indirect costs by allowing users to install capacity only for data actually written, and gradually grow it over time with minimal management effort
- Greener power usage enabled through the use of large capacity SATA drives and optimized use of disk capacity, resulting in outstanding power consumption efficiency per TB, without compromising performance
- Customer-centric, low point of entry (27 TB usable) with incremental scaling (in 6 TB increments) to full rack capacity (79 TB usable), enabling organizations to start small based on current needs and flexibly add capacity while in production and with no need to reconfigure.

XIV Warranty, Maintenance, and Service

The IBM XIV Storage System offers a flexible warranty choice with a one or three year hardware warranty that includes IBM installation and 24x7 IBM onsite, same-day-response. The IBM XIV Storage System software licenses include software maintenance (software subscription and technical support) for a period of one year from the date of acquisition. Coverage can be extended to cover two, three, four, up to five years, if elected. Additional hardware and software services are also offered to help organizations optimize their storage infrastructures.

SAN Volume Controller

IBM System Storage SAN Volume Controller (SVC) (Figure V.1) is a storage virtualization system designed to help customers reduce storage costs and improve efficiency. It does this by helping to improve storage utilization, reduce storage growth, simplify management, improve storage administrator productivity, implement tiered storage infrastructures (now including solid-state storage), eliminate application downtime associated with storage, and enable greater freedom in storage acquisitions.

SAN Volume Controller is designed to pool storage volumes from IBM and non-IBM storage systems into reservoirs of capacity for centralized management. SAN Volume Controller is also designed to hide the boundaries among disk systems, which helps customers to focus on managing storage as a resource to meet business requirements and not as a set of boxes. The SVC scalable architecture and the full integration

- SAN Volume Controller sales kit on PartnerWorld
- SAN Volume Controller info on PartnerWorld
- SAN Volume Controller info on IBM.com
- SAN Volume Controller competitive info on COMP

Figure V.1. IBM System Storage SAN Volume Controller (and links to more detail).

of SSDs into the SVC architecture enable customers to take advantage of the throughput capabilities of the SSDs. SVC now supports iSCSI server attachment for simpler and lower cost infrastructure.

Here are some quick SAN Volume Controller facts:

- Designed to combine storage capacity from multiple disk systems into a capacity reservoir that can be managed more efficiently
- Designed to help increase storage utilization by providing host applications with more flexible access to capacity
- Designed to help improve storage administrator productivity by automating provisioning and enabling management

of heterogeneous storage systems using a simple common interface

- Designed to support improved application availability by practically eliminating storage-related causes of application downtime
- Designed to enable a tiered storage environment in which the cost of storage can be better matched to the value of data
- Designed to support advanced copy services from higher- to lower-cost devices and across storage systems from multiple vendors
- Designed to reduce costs and improve flexibility with iSCSI host attachment
- Designed to enable greater flexibility in storage acquisitions
- Designed to deliver ultra-high performance for critical workloads with innovative and tightly integrated support for solid-state devices (SSDs).

SVC Entry Edition

IBM System Storage SAN Volume Controller Entry Edition (SVC EE) is a new storage virtualization system that is designed to deliver enterprise-class capabilities in a package optimized for midsize businesses (Figure V.2). SVC EE is based on IBM's SAN Volume Controller offering but delivered in a more affordable package. Storage virtualization with SVC EE helps hide much of the complexity of storage environments both from servers and also from administrators. Servers and

- SAN Volume Controller Entry Edition sales kit
- SAN Volume Controller Entry Edition info on PartnerWorld
- SAN Volume Controller Entry Edition info on IBM.com
- SAN Volume Controller competitive info on COMP

Figure V.2. IBM System Storage SAN Volume Controller Entry Edition (and links to more detail).

administrators are presented with a single type of storage system with a single management interface and common network-based replication functions, regardless of the type of physical storage being used. Storage virtualization with SVC EE helps you focus on using storage as a resource to support your business needs and not as boxes that must be managed.

SAN Volume Controller Entry Edition software is delivered pre-installed on SVC Storage Engines so it is quickly ready for implementation once the engines are attached to your storage area network (SAN). SVC Storage Engines are based on proven IBM System x server technology and are always deployed in redundant pairs, which are designed to deliver very

high availability. SVC Entry Edition is designed to take control of existing storage, retaining all your existing information. This ability helps speed and simplify implementation while helping to minimize the need for additional storage. Once SVC EE is implemented, you can make changes to the configuration quickly and easily as needed.

Here are some quick SVC EE facts:

- Enterprise-class storage virtualization in a more affordable package for midsize businesses
- Designed to combine storage capacity from multiple disk systems into a capacity reservoir that can be managed more efficiently
- Designed to help increase storage utilization by providing host applications with more flexible access to capacity
- Designed to help improve storage administrator productivity by automating provisioning and enabling management of heterogeneous storage systems using a simple common interface
- Designed to support improved application availability by practically eliminating storage-related causes of application downtime
- Designed to enable a tiered storage environment in which the cost of storage can be better matched to the value of data
- Designed to support advanced copy services from higher- to lower-cost devices and across storage systems from multiple vendors

- Designed to reduce costs and improve flexibility with iSCSI host attachment
- Designed to enable greater flexibility in storage acquisitions
- Supports a wide range of operating systems including Microsoft Windows, UNIX, Linux, and VMware.

N series

IBM N series unified storage products provide a wide range of network attachment capabilities to a broad range of host systems. IBM N series systems allow both SAN and NAS storage to be consolidated on to a single modular platform.

N3000 Express series

IBM System Storage N3000 Express series Modular Disk Storage Systems (Figure N.1) are designed to provide primary and secondary storage for midsize enterprises. Consolidating all of their fragmented application-based storage and unstructured data into one unified, easily managed, and expandable platform can help IT generalists increase their effectiveness. N3000 Express systems offer integrated block-level and file-level data access, intelligent management software, and data protection capabilities—such as higher-end N series systems—in a cost-effective package. IBM N3000 Express series innovations include internal controller support for Serial Attached SCSI (SAS) or SATA drives, expandable I/O connectivity, and on board remote management.

The IBM N3000 Express is compatible with the entire family of N series unified storage systems, which feature a

Specifications

	N3300	N3300	N3600	N3600
Machine type/model	2859-A10	2859-A20	2862-A10	2862-A20
Controller configuration	Single	Dual (active/active)	Single	Dual (active/active)
Random access memory	1 GB	2 GB	2 GB	4 GB
Fibre channel ports (speed)	2 (4 Gbps)	4 (4 Gbps)	2 (4 Gbps)	4 (4 Gbps)
Ethernet ports (speed)	2 (1 Gbps)	4 (1 Gbps)	2 (1 Gbps)	4 (1 Gbps)
Maximum raw capacity	68 TB	68 TB	104 TB	104 TB
Maximum number of disk drives	68	68	104	104
Maximum volume size	16 TB	16 TB	16 TB	16 TB
Maximum number of volumes/LUNs	1024	1024	1024	1024
Disk drives supported in controller (type, size, speed)	SAS: 300 GB, 15,000 rpm; 450 GB, 15,000 rpm SATA: 500 GB, 7,200 rpm; 1 TB			

- N3000 Resource Kit on PartnerWorld
- N3000 details on PartnerWorld
- N3000 details on IBM.com
- N3000 competitive info on COMP

Figure N.1. IBM System Storage N3000 Express series (N3300 and N3600) at a glance (and links to more detail).

comprehensive line-up from top-to-bottom of hardware and software designed to address a variety of possible deployment environments.

The N3300 Express squeezes 12 TBs of internal raw capacity into a 2U enclosure and optional external expansion that can increase total system raw capacity to 68 TB. The N3600 Express scales up to 20 TB of internal raw capacity and can scale up to 104 TB by supporting up to 104 disk drives. Whether for primary or secondary storage use, the N3000 Express systems are intended to provide outstanding deployment versatility and connectivity to help satisfy your data protection and recovery needs.

Here are some quick N3000 facts:

- *High availability*—Takes advantage of proven features including a high performing and scalable operating system, data management software, and redundancy features
- *Backup and recovery features*—Designed to support disk-based backup, with file or application-level recovery with Snapshot and SnapRestore software features
- *Simple replication and disaster recovery*—Designed to provide an easy-to-deploy mirroring solution that is highly tolerant of WAN interruptions
- *Management simplicity*—Self-diagnosing systems designed to enable on-the-fly provisioning
- *Versatile*—Single, integrated architecture designed to support concurrent block I/O and file serving over Ethernet and Fibre Channel SAN infrastructures.

N6000 series

The IBM N6000 series systems (Figure N.2) offer a versatile storage platform for handling the large amounts of diverse data moving through your business. N6000 series systems help a business consolidate these varied data sets onto a unified storage platform supporting simultaneous block and file services for business and technical applications. With IBM N6000 series, you can unlock the full potential of your growing virtualized server environment by enabling virtual machine mobility and offloading the work of data protection. The N6000 systems enable you to connect your heterogeneous server environment (including Windows, UNIX, and Linux servers) and clients to one storage system by using standard storage protocols and interfaces.

IBM N6000 series systems can help you spend less time on backup and recovery so you can focus your energy and creativity on growing your business. Our full range of enterprise-class, high availability, and disaster-recovery products provide affordable software for data protection to help safeguard your business-critical applications' data. IBM N series Snapshot technology helps reduce backup times to minutes; SnapRestore software enables recovery of point-in-time data, also in minutes.

IBM N series SnapManager software quickly returns applications to the same point in time as recovered data. All of this is built on the solid foundation of our low-overhead, dual-parity RAID-DP—the IBM N series implementation of high-performance RAID 6 for better data protection and capacity utilization than RAID 5 and RAID 1+0.

Specifications

	N6040	N6040	N6060	N6070
Machine Type/model	2858-A10	2858-A20	2858-A22	2858-A21
Controller configuration	Single	Dual (active/active)	Dual (active/active)	Dual (active/active)
Processor speed and type	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron
Number of processors	1	2	4	4
Random access memory	4 GB	8 GB	16 GB	32 GB
Nonvolatile memory	512 MB	1 GB	4 GB	4 GB
Fibre Channel ports (speed)	4 (4 Gbps)	8 (4 Gbps)	8 (4 Gbps)	8 (4 Gbps)
Ethernet ports (speed)	2 (1 Gbps)	4 (1 Gbps)	2 (1 Gbps)	4 (1 Gbps)
Maximum number of Fibre Channel loops	10	10	10	10
Maximum raw capacity	420 TB	420 TB	672 TB	840 TB
Maximum number of disk drives	420	420	672	840
Maximum volume size	16 TB	16 TB	16 TB	16 TB
Maximum number of volumes/LUNs	2048	2048	2048	2048
Maximum number of storage enclosures	30	30	48	60

- N6000 Resource Kit on PartnerWorld
- N6000 details on PartnerWorld
- N6000 details on IBM.com
- N6000 competitive info on COMP

Figure N.2. IBM System Storage N series at a glance (and links to more detail).

Here are some quick N6000 facts:

- *Meet diverse and changing needs*. Consolidate diverse data sets onto a unified storage platform that provides simultaneous block and file services for business and technical applications.
- *Perform when your applications need it most*. Outstanding file-based and transaction-based performance with high bandwidth, 64-bit architecture, and the latest I/O technologies.
- *Respond to growth*. Thin provisioning helps eliminate stranded storage. Preserve investments in staff expertise and capital equipment with data-in-place upgrades to more powerful N series systems while running the same OS and using the same management tools.
- *Maximize your resources*. Highly efficient storage utilization makes it possible for you to dramatically reduce your consumption of raw storage, power, cooling, and space.
- *Improve your business efficiency*. Clients with different storage subsystems in their SAN environments can now take advantage of the N6000 series Gateway capabilities to help improve business efficiency and reduce data management complexity.

N7000 series

The IBM System Storage N7000 series systems (Figure N.3) are intended to help IT organizations tackle the challenge of effective data management using virtualization technology and a unified storage architecture. The N7000 series is

Specifications

	N7900
Machine type model	**2867-A21**
Gateway machine type model	2867-A21 (w/FC 9551)
Controller configuration	Dual (active/active)
Processors speed and type	2.6 GHz AMD Dual Core Opteron
Number of processors	8
Random access memory	64 GB
Nonvolatile Memory	4 GB
Fibre Channel ports/speed	16 (4 Gbps)
Ethernet ports/speed	12 (1-Gbps)
Maximum number of Fibre Channel loops	14
Maximum raw capacity	1176 GB
Maximum number of disk drives	1176
Maximum volume size	16 TB
Maximum number of volumes/LUNs	2048
Maximum number of storage enclosures	84

- N7000 Resource Kit on PartnerWorld
- N7000 details on PartnerWorld
- N7000 details on IBM.com
- N7000 competitive info on COMP

Figure N.3. IBM System Storage N7000 series at a glance (and links to more detail).

designed to deliver high-end enterprise storage and data management value with midrange affordability. Built-in enterprise serviceability and manageability features help support your efforts to increase reliability, simplify, and unify storage infrastructure and maintenance, and deliver exceptional economy.

The N7000 series, like all N series systems, provides powerful virtualization and thin-provisioning capabilities intended to maximize storage utilization and staff productivity while minimizing the use of power, cooling, and floor space. Staff productivity can be enhanced by an integrated suite of application-aware manageability software that can provide policy-based automation to otherwise manual tasks. The IBM N7000 series is designed to provide remarkable versatility by unifying FC SAN, iSCSI SAN, NAS, primary, nearline, and regulatory compliance data retention and archival storage in an integrated architecture. The combination of versatility and simplicity of N series systems is intended to help IT professionals respond quickly to changing business needs.

The N7000 series combines the benefits of a unified storage architecture suite of application-aware software with massive scalability, which is intended to provide an ideal platform for large-scale data center applications and storage consolidations. In addition, the N7000 series ordered through a Gateway feature can help you optimize the use of your existing storage equipment, and improve efficiency and return on investment while continuing to support different access methods for different business solutions throughout the enterprise.

Here are some quick N7000 facts:

- *Scalable*—Designed for nondisruptive expansion to more than 1.1 petabytes (1.1 PB or 1100 TB) storage capacity
- *Versatile*—Integrated architecture designed to support concurrent block I/O and file serving over Ethernet and Fibre Channel SAN infrastructures
- *Efficient consolidation*—Intended to provide storage for multiple applications in a system with FlexShare to ensure that critical workloads get priority service
- *Application availability*—N7000 systems with Data ONTAP enable application-level recovery in minutes, not hours, upon failure or user error
- *Performance*—Delivers high, consistent performance for mission-critical applications.

N series Gateways

The IBM System Storage N series Gateway product line is a network-based unified storage solution designed to provide Internet Protocol (IP) and Fibre Channel (FC) protocol access to SAN-attached heterogeneous storage arrays. The N6000 (Figure N.4) and N7000 series (Figure N.5) ordered with a Gateway feature can help you make the most of the dynamic provisioning capabilities of Data ONTAP software across your existing Fibre Channel SAN infrastructure to support an expanded set of business applications. The IBM N series Gateway is based on the Data ONTAP microkernel operating system, which is designed to unify block and file storage networking paradigms under a common architecture. The N se-

Specifications

	N6040	N6040	N6060	N6060
Machine Type/Model	2858-A10	2858-A20	2858-A12	2858-A22
Feature Code	w/FC 9551	w/FC 9551	w/FC 9551	w/FC 9551
Controller configuration	Single	Dual (active/active)	Single	Dual (active/active)
Processor speed and type	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron
Number of processors	1	2	2	4
Random access memory	4 GB	8 GB	8 GB	16 GB
Nonvolatile memory	512 MB	1 GB	2 GB	4 GB
Fibre Channel ports (speed)	4 (4 Gbps)	8 (4 Gbps)	4 (4 Gbps)	8 (4 Gbps)
Ethernet ports (speed)	2 (1 Gbps)	4 (1 Gbps)	2 (1 Gbps)	4 (1 Gbps)
Maximum number of Fibre Channel loops	10	10	10	10
Maximum raw capacity	420 TB	420 TB	672 TB	672 TB
Maximum number of disk drives	420	420	672	672
Maximum volume size	16 TB	16 TB	16 TB	16 TB
Maximum number of volumes/LUNs	2048	2048	2048	2048
Maximum number of storage enclosures	30	30	48	48

- N series Gateway Resource Kit on PartnerWorld
- N series Gateway details on PartnerWorld
- N series Gateway details on IBM.com
- N series Gateway competitive info on COMP

Figure N.4. IBM System Storage N series Gateway (N6040, N6060) at a glance (and links to more detail). *(continued on next page)*

Specifications

	N6070	N6070
Machine Type/Model	2858-A11	2858-A21
Feature Code	w/FC 9551	w/FC 9551
Controller configuration	Single	Dual (active/active)
Processor speed and type	2.4 GHz AMD Dual-core 64-bit Opteron	2.4 GHz AMD Dual-core 64-bit Opteron
Number of processors	2	4
Random access memory	16 GB	32 GB
Nonvolatile memory	2 GB	4 GB
Fibre Channel ports (speed)	4 (4 Gbps)	8 (4 Gbps)
Ethernet ports (speed)	2 (1 Gbps)	4 (1 Gbps)
Maximum number of Fibre Channel loops	10	10
Maximum raw capacity	840 TB	840 TB
Maximum number of disk drives	840	840
Maximum volume size	16 TB	16 TB
Maximum number of volumes/LUNs	2048	2048
Maximum number of storage enclosures	60	60

- N series Gateway Resource Kit on PartnerWorld
- N series Gateway details on PartnerWorld
- N series Gateway details on IBM.com
- N series Gateway competitive info on COMP

Figure N.4. IBM System Storage N series Gateway (N6070) at a glance (and links to more detail). *(continued from previous page)*

Specifications

	N7700	N7900
Machine type model	2866-A21	2867-A21
Feature Code	w/FC 9551	w/FC 9551
Gateway machine type model	2866-A21 (w/FC 9551)	2867-A21 (w/FC 9551)
Controller configuration	Dual (active/active)	Dual (active/active)
Processor speed and type	2.6 GHz AMD Opteron	2.6 GHz AMD Dual Core Opteron
Number of processors	4	8
Random access memory	32 GB	64 GB
Nonvolatile memory	1 GB	4 GB
Fibre Channel ports/speed	16 (4 Gbps)	16 (4 Gbps)
Ethernet ports/speed	12 (1 Gbps)	12 (1 Gbps)
Maximum number of Fibre Channel loops	10	14
Maximum raw capacity	840 GB	1176 GB
Maximum number of disk drives	840	1176
Maximum volume size	16 TB	16 TB
Maximum number of volumes/LUNs	2048	2048
Maximum number of storage enclosures	60	84

- N series Gateway details on PartnerWorld
- N series Gateway details on IBM.com
- N series Gateway competitive info on COMP

Figure N.5. IBM System Storage N series Gateway (N7700, N7900) at a glance (and links to more detail).

ries Gateway is designed to provide a comprehensive suite of advanced data management capabilities to help you consolidate, protect, and recover mission-critical data for enterprise applications and users.

The IBM N series Gateway is designed to deliver the performance and capacity to meet access requirements for enterprises of all sizes. N series Gateway systems are intended to deliver industry leading performance, offer terabytes of managed capacity, and be configured for simultaneous active/active access with secure failover across two independent systems in a cluster.

The N6000 and N7000 series Gateway product lines support the attachment to both N series EXN1000 and EXN4000 disk storage expansion units, as well as a broad range of IBM, EMC, Hitachi, Fujitsu, 3PAR, and HP storage subsystems, including the IBM Enterprise Storage Server (ESS) series, XIV Storage Systems, IBM System Storage DS8000 and DS4000 series. Clients with these storage subsystems in their SAN environments can now take advantage of the N series Gateway capabilities to help improve business efficiency and reduce data management complexity.

Here are some quick N series Gateway facts:

- *Heterogeneous unified storage environment*—Designed to provide unified storage access for multiprotocol, multivendor storage environments

- *Versatile*—Single, integrated architecture designed to support concurrent block I/O and file serving over Ethernet and Fibre Channel SAN infrastructures

- *Storage consolidation*—Designed to enable organizations to consolidate UNIX, Linux, Windows, and Web workloads with existing SAN storage, thereby helping to increase storage utilization
- *Builds on existing SAN infrastructure*—Designed to integrate into existing SAN storage environments, helping to optimize investment protection and ROI
- *Data management*—Designed to provide advanced data management solutions that maximize availability and help to reduce operational costs significantly
- *Comprehensive software suite*—Designed to provide robust system management, copy services, virtualization technologies and disaster recovery and backup capabilities across all SAN resources.

N series Software

The IBM System Storage N series also provides a selection of features and functions delivered through software offerings which are designed to provide a comprehensive set of robust management and operational tools as well as high availability features, disaster recover, and data copy services that help the system administration provide a high level of support for environments requiring IP attached storage solutions.

Here are a few examples of the many different N series software offerings:

More on the Web

- N series software info on IBM.com

- Deduplication A-SIS (Advanced Single Instance Storage)
  - Performs block level data de-duplication on NearStore data volumes
  - Volume data is automatically scanned and de-duplicated, resulting in immediate space savings with minimal impact on operations
- Data ONTAP
  - N series storage operating system provides full-featured and unified data management for both block and file serving environments
  - Single architecture and user interface simplify data management and reduce costs for SAN and NAS deployment
- Disk Sanitization
  - The process of physically obliterating data by overwriting disks with specified byte patterns or random data
  - Helps prevent recovery of current data by any known recovery methods
- FlexClone
  - Instantaneously creates LUN and volume clones without requiring additional storage
  - Accelerated test and development and storage capacity savings
- FlexShare

  - Prioritizes storage resource allocation to highest value workloads on a heavily loaded system
  - Ensures that best performance is provided to designated high-priority applications
- FlexVol
  - Creates flexibly sized LUNs and volumes across a large pool of disks and one or more RAID groups
  - Fast, simple, and flexible storage provisioning and high-capacity utilization
  - Regulatory compliance solution for spreadsheets, presentations, and other unstructured application data
- MetroCluster
  - An integrated high-availability/disaster recovery solution for campus and metro-area deployments
  - Ensures high data availability when a site failure occurs
- MultiStore
  - Securely partitions a storage system into multiple virtual storage appliances
  - Enables secure consolidation of multiple domains and file servers
- NearStore (near-line)
  - Increases the maximum number of concurrent data streams (per storage controller)

  - Enhances backup, data protection, and disaster preparedness by increasing the number of concurrent data streams between two N series systems

- Operations Manager
  - Manages multiple N series systems from a single administrative console
  - Faster deployment and consolidated management of multiple N series systems
- Protection Manager
  - Backup and replication management software for N series disk-to-disk environment
  - Improves productivity through automation of data protection tasks; delivers higher assurance of data protection than with manual execution of tasks by reducing human errors
- RAID-DP
  - Double parity bit, RAID protection (N series RAID 6 implementation)
  - Protects against data loss due to double disk failures and media bit errors occurring during drive rebuild processes
- SecureAdmin
  - Authenticates both the administrative user and the N series system, creating a secure, direct communication link to the N series system

  - Helps protect administrative logins, passwords, and session commands from "cleartext" snooping by replacing rsh and telnet with the strongly encrypted SSH protocol

- Single Mailbox Recovery for Exchange (SMBR)
  - Enables the recovery of a single mailbox from a Microsoft Exchange Information Store
  - Can extract a single mailbox or email directly in minutes compared to hours with traditional methods
  - Helps eliminate the need for IT staff
- SnapDrive
  - Provides host-based data management of N series storage from Windows, UNIX, and Linux servers
  - Simplifies host-consistent Snapshot copy creation and automates error-free restores
- SnapLock
  - Write-protects structured application data files within a volume to provide non-erasable, non-rewriteable disk storage

– Provides storage enabling compliance with government records retention regulations

- SnapManager
  - Provides host-based data management of N series storage for databases and business applications (MS Exchange, SAP, Oracle, MS Sharepoint, VMware, and MS Hyper-V)

  - Simplifies application-consistent Snapshot copies, automates error-free data restores, and enables application-aware disaster recovery

- SnapMirror
  - Enables automatic, incremental data replication between systems: synchronous or asynchronous
  - Provides flexible, space- and network-efficient site-to-site mirroring for disaster recovery and data distribution
- SnapMover
  - Enables rapid reassignment of disks between controllers within a system without disruption
  - Enables fast, non-disruptive load balancing within an active-active controller system
- SnapRestore
  - Rapidly restores single files, directories, or entire LUNs and volumes from any Snapshot backup
  - Enables near-instantaneous recovery of files, databases, and complete volumes
- Snapshot
  - Makes incremental, data-in-place, point-in-time copies of a LUN or volume with minimal performance impact
  - Enables frequent, non-disruptive, space-efficient, and quickly restorable backups

- SnapValidator
  - Maximizes data integrity for Oracle databases
  - Enhances Oracle database resiliency in compliance with Oracle HARD initiative
- SnapVault
  - Exports Snapshot copies to another N series system, providing an incremental block-level backup solution
  - Enables cost-effective, long-term retention of rapidly restorable disk-based backups
- SyncMirror
  - Maintains two online copies of data with RAID-DP protection on each side of the mirror
  - Protects against all types of hardware outages, including triple disk failure.

Tape Storage

Server systems are woven deeply into today's business processes and are at the core of day-to-day operations. This information is thus a valuable corporate asset that must be protected. Tape storage provides a cost-effective and efficient means of backing up and archiving the information held on disk storage. Tape storage plays a vital role in reducing storage costs, maintaining data availability in the event of hardware fail-

More on the Web

- All tape offerings on IBM.com

ures, restoring data files accidentally or maliciously erased, restoring operations after a disaster, and so forth. In this section, we examine IBM's tape storage offerings.

Tape Storage Cross Reference by Workload Size

It is often a mistake to associate an entry-level, midrange, and enterprise-class storage product with small, medium, and large size businesses respectively. The amount of data stored often does not correlate with the number of employees or revenue metrics often cited in determining size.

For this reason, recommendations on products based on actual workloads often makes more sense though still should be considered only a general guideline. In this section, you will find a list of tape storage products organized by workload size (entry, midsize, and enterprise) to help you find the best solution for your client.

Tape Storage for Entry-Level Workloads

Here is a list of tape storage products designed for entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

More on the Web

- Tape for entry-level workloads

TS2230 Express

TS2240 Express

TS2340 Express

TS2900 Tape Autoloader

TS3100 Express

TS3100 Express (half-high)

TS3200 Express

TS3200 Express (half-high)

TS3310

7206 Model 336

7207

7212

7214

Tape Storage for Midsize Workloads

Here is a list of tape storage products designed for midsize workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

More on the Web

- Tape for midsize business workloads

TS2340 Express

TS3100 Express

TS3100 Express (half-high)

TS3200 Express

TS3200 Express (half-high)

TS3310

TS3400

TS3500

Tape Storage for Enterprise Workloads

Here is a list of tape storage products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

More on the Web

- Tape for enterprise workloads

TS1120

TS1130

TS3400

TS3500

TS7700

TS1120 Tape Drive

The IBM System Storage TS1120 Tape Drive (Figure T.1) offers a solution to address applications that need high capacity, fast access to data, or long-term data retention. It is supported in IBM tape libraries, IBM frames that support stand-alone installation, and in an IBM 3592 Tape Frame Model C20 (3592 C20 frame) attached to a Sun StorageTek 9310 library.

The tape drive uses IBM 3592 Cartridges, which are available in limited capacity (100 GB) for fast access to data, and standard capacity (500 GB) or extended capacity (700 GB) that help to reduce resources to a lower total cost. All three

Specifications

Recording technique	Linear Serpentine
Number of tracks	896
Native capacity	700 GB (using JB/JX media), 3003/500 GB (using JA/JW media) or 60/100 GB (using JJ/JR media)
Native data rate	104 MBps
Adaptive instantaneous data rates	163, 134, 109, 83, 56, 43 MBps for 3592 JB cartridges data rates initialized in Gen 3 format 150, 127, 104, 78, 52, 40 MBps for 3592 JB cartridges
Burst data rate	400 MBps
High-speed search	10 mps

- TS1120 details on PartnerWorld
- TS1120 details on IBM.com
- TS1120 competitive info on COMP

Figure T.1. IBM System Storage TS1120 at a glance (and links to more detail).

cartridges are available in re-writable or write once read many (WORM) format.

TS1120 tape drives can be shared among supported open system hosts on a storage area network (SAN) or between IBM FICON and ESCON mainframe hosts when attached to an IBM System Storage TS1120 Tape Controller. Sharing drives optimizes drive utilization and helps reduce infrastructure requirements.

Here are some quick TS1120 facts:

- Supports IBM systems and selected open system platform capacity cartridges
- Supports 3592 fast access, standard capacity, and extended capacity cartridges
- Supported on existing IBM and Sun StorageTek automation
- Offers a native data transfer rate of up to 104 MBps
- Supports data encryption and key management.

TS1130 Tape Drive

The IBM System Storage TS1130 Tape Drive (Figure T.2) features storage capability to help you establish easy access to data, better security, long-term retention and data governance, and regulatory compliance. The TS1130 tape drive offers high-performance flexible data storage with support for data encryption. The TS1130 tape drive can help you protect your investments in tape automation by offering compatibility with existing automation. To further protect your investment, an upgrade model is available for your ex-

Specifications

Recording technique	Linear Serpentine	
Number of tracks	1152	
Native capacity (uncompressed)	1 TB (using JB/JX media), 640 GB (using JA/JW media) or 128 GB (using JJ/JR media)	
Native sustained data rate (uncompressed)	160 MBps	
Adaptive instantaneous data rates	163, 134, 109, 83, 56, 43 MBps for 3592 JB cartridges initialized in Gen 3 format 150, 127, 104, 78, 52, 40 MBps for 3592 JB cartridges initialized in Gen 2 format 71, 59, 47, 36, 24, 19, 13 MBps for 3592 JA cartridges initialized in Gen 1 format	
Burst data rate	400 MBps	
High-speed search (max)	12.4 mps	
Warranty	One year	
Platform Support	Platform	Operating System
IBM	Power Systems	IBM AIX, IBM i, Linux
	System p	IBM AIX and Linux
	System i	IBM i1 and IBM OS/400
	System x	see open system support
	System z	IBM z/OS, IBM z/VM, IBM VSE, and Linux

- TS1130 details on PartnerWorld
- TS1130 details on IBM.com
- TS1130 competitive info on COMP

Figure T.2. IBM System Storage TS1130 at a glance (and links to more detail).

isting IBM System Storage TS1120 Tape Drives. And to support a heterogeneous server environment, the TS1130 offers multiplatform support.

The TS1130 Tape Drive supports IBM System Storage TS3400 and TS3500 Tape Libraries, IBM TotalStorage 3494 Tape Libraries, IBM Virtualization Engine TS7700, IBM racks that enable standalone installation, and IBM 3952 Tape Frames Model C20 (3952C20 frame) attached to a Sun 9310 library.

Here are some quick TS1130 facts:

- Provides information security with support for encryption and key management
- Optimizes information retention with support for existing IBM tape automation
- Supports write once read many (WORM) cartridges to help satisfy compliance requirements
- Offers high performance and high capacity for storage consolidation.

TS2230 Tape Drive Express

The IBM System Storage TS2230 Tape Drive Express LTO3 HH Model (Figure T.3)—the entry-level IBM System Storage tape product family offering—is the answer to growing storage requirements and shrinking backup windows. By leveraging advanced linear tape-open technology and the half-high format, the TS2230 Tape Drive is suited for handling the backup, save and restore, and archival data storage needs of a wide range of small systems.

Specifications

Model number	3580 H3S (HH SAS PN 3580S3E); 3580 H3L (HH LVD SCSI PN 3580L3E)
Rack-mount option	96P1565
Tape drive type	IBM LTO Ultrium 3 Half High
Capacity per cartridge	Up to 800 GB compressed; 400 GB native
Sustained data transfer rate	Up to 60 MBps native
Media type	IBM Ultrium 3
Data cartridge	IBM TotalStorage LTO Ultrium 400 GB Data Cartridge (P/N 24R1922)
Cleaning cartridge	IBM TotalStorage LTO Cleaning Cartridge (P/N 35L2086)
Attachment and systems support	The TS2230 features an LVD Ultra160 SCSI and a 3 Gbps SAS interface attaching to IBM p5, System p, i5, System i, System x, RS/6000, RS/6000 SP, AS/400 and Netfinity systems as well as to non-IBM servers and workstations. The TS2230 connects to Fibre Channel server adapters through selected IBM Storage Area Network Data Gateway products.
Operating systems supported	Native device driver support is available for IBM AIX, OS/400, and i5/OS; Microsoft Windows 2000 (build 2195 or greater) and Windows Server 2003 (build 3790 or greater); Sun Solaris 8 and 9; HP-UX 11.0 and 11i; and Red Hat Enterprise Linux

- TS2230 Express details on PartnerWorld
- TS2230 Express details on IBM.com
- TS2230 Express competitive info on COMP

Figure T.3. IBM System Storage TS2230 Tape Drive Express at a glance (and links to more detail).

The System Storage TS2230 Tape Drive Express LTO3 HH Model is an excellent tape storage solution for businesses requiring backup or low-cost, real-time archival of their data within a small window of time. The TS2230 has a storage capacity of up to 800 GB (with 2:1 compression) in conjunction with the IBM TotalStorage LTO Ultrium 400 GB data cartridge, which is double the capacity of the Ultrium 2 technology. Along with its higher capacity, the performance of the TS2230 Tape Drive has more than doubled over the previous generation of half-high LTO drives on the market for a native data transfer rate of up to 60 MBps. The TS2230 Tape Drive provides an excellent alternative to slower and smaller capacity 1/4-inch, 4 mm, and 8 mm DLT/SDLT tape drives.

Here are some quick TS2230 facts:

- An entry-level Ultrium tape solution for the midrange and network tape storage environments
- Designed to provide cost-effective backup, save and restore, and archival storage external to the server
- Double the storage capacity of existing HH LTO2 drives on the market
- Adheres to widely supported Linear Tape-Open (LTO) standards.

TS2240 Tape Drive Express

The IBM System Storage TS2240 Tape Drive Express (Figure T.4)—the entry-level IBM TotalStorage tape product family offering—is the answer to growing storage requirements

Specifications

Available configurations	Model 3580 H4S (HH SAS PN 3580S4E)
Common features	
Tape drive type	IBM LTO Ultrium 4
Physical capacity	Up to 1.6 TB per cartridge with 2:1 compression; 800 GB native
Number of tape drives	1
Number of tape cartridges	1
Data transfer rate	Up to 120 MB/sec native
Media type	IBM LTO Ultrium 4, IBM TotalStorage LTO Ultrium 800 GB Data Cartridge, IBM TotalStorage LTO Cleaning Cartridge

- TS2240 Express details on PartnerWorld
- TS2240 Express details on IBM.com
- TS2240 Express competitive info on COMP

Figure T.4. IBM System Storage TS2240 at a glance (and links to more detail).

and shrinking backup windows. Incorporating the latest generation of advanced linear tape-open (LTO) technology, the TS2240 Tape Drive is suited for handling the backup, save and restore, and archival data storage needs of a wide range of small systems. In addition, the TS2240 provides added

security features by supporting encryption of data with 3 Gbps SAS connectivity.

The System Storage TS2240 Tape Drive is an excellent tape storage solution for businesses requiring backup or low-cost, real-time archival storage of their data. The TS2240, with a half-high form factor, offers the same high capacity of full-high LTO 4 tape drives. The TS2240 has a physical storage capacity of up to 1.6 TB (with 2:1 compression) in conjunction with the new IBM System Storage LTO Ultrium 800 GB data cartridge, which provides up to double the capacity of Ultrium 3 cartridges. The native data transfer performance of the TS2240 Tape Drive has increased over the previous LTO half-high generation to up to 120 MB/sec. The TS2240 Tape Drive continues to provide an excellent alternative to slower and smaller capacity 1/4-inch, 4 mm, and 8 mm DLT/SDLT tape drives.

Here are some quick TS2240 facts:

- Designed to provide high-capacity tape storage in a small half-high form factor to address backup and archiving requirements
- Available hardware encryption designed to offer highly secure data storage
- Native data transfer rate of up to 120 MB/sec.

TS2340 Tape Drive Express

The IBM System Storage TS2340 Tape Drive (Figure T.5)—the entry-level IBM System Storage tape product family offering—is the answer to growing storage requirements and

Specifications

Available configurations	Model 3580 L43 (SCSI PN 3580L4X) Model 3580 S43 (SAS PN 3580S4X)
Common features	
Tape drive type	IBM LTO Ultrium 4
Physical capacity	Up to 1.6 TB per cartridge with 2:1 compression; 800 GB native
Number of tape drives	1
Number of tape cartridges	1
Data transfer rate	Up to 120 MB/sec native
Media type	IBM LTO Ultrium 4 IBM TotalStorage LTO Ultrium 800 GB Data Cartridge IBM TotalStorage LTO Cleaning Cartridge

- TS2340 Express details on PartnerWorld
- TS2340 Express details on IBM.com
- TS2340 Express competitive info on COMP

Figure T.5. IBM System Storage TS2340 at a glance (and links to more detail).

shrinking backup windows. Incorporating the latest generation of advanced linear tape-open (LTO) technology, the TS2340 Tape Drive is suited for handling the backup, save and restore, and archival data storage needs of a wide range of small systems. In addition, the TS2340 provides added security features by supporting encryption of data with 3 Gbps SAS connectivity.

The IBM System Storage TS2340 Tape Drive is an excellent tape storage solution for businesses requiring backup or low-cost, real-time archival storage of their data within a small window of time—it offers high-capacity and performance to help address the most demanding requirements. The TS2340 has a physical storage capacity of up to 1.6 TB (with 2:1 compression) in conjunction with the new IBM Ultrium 800 GB data cartridge, which provides up to double the capacity of previous Ultrium 3 technology. Along with its higher capacity, the data transfer performance of the TS2340 Tape Drive has increased over the previous generation for a native data transfer rate of up to 120 MBps. The TS2340 Tape Drive continues to provide an excellent alternative to slower and smaller capacity 1/4-inch, 4 mm, and 8 mm DLT/SDLT tape drives.

Here are some quick TS2340 facts:

- Designed to provide high-capacity and performance to address the most demanding backup and archiving requirements
- Double the cartridge capacity of previous generation LTO drives

- Available hardware encryption designed to offer highly secure data storage along with high performance
- Native data transfer rate of up to 120 MBps
- Choice of SCSI or SAS interfaces.

TS2900 Tape Autoloader Express

The IBM System Storage TS2900 Tape Autoloader Express (Figure T.6) is designed for entry-level automated backup for rack system and small-to-medium business environments. With a low profile, high density storage capacity, the TS2900 is ideally suited for backup and archival operations. The TS2900 is available with IBM HH LTO 3 or HH LTO 4 tape technology for a reliable, low entry-priced solution.

The TS2900 is equipped with standard features designed to provide ease-of-use and secured data backup. Web-based remote management, a bar code reader, and a removable tape magazine help provide the autoloader flexibility in application. The TS2900 can be used in a rack system or on a desktop next to the office server. These types of features help reduce the requirements of IT personnel staff, as well as help centralize backup in the data center. The TS2900 also is designed to support the encryption of sensitive user data in combination with HH LTO 4 tape technology from IBM. With 3 Gbps SAS attach, the TS2900 is supported on IBM Power Systems, IBM System x, Intel, and other competitive open system server platforms.

Specifications

Drive Options	Ultrium 3 half high: 3 Gbps SAS Ultrium 4 half high: 3 Gbps SAS
Available Models	3572-S3H (HH SAS drive PN 3572S3R) 3572-S4H (HH SAS drive PN 3572S4R)
Optional Feature Codes	
Deskside Cover kit	PN 45E3789
Additional Tape Magazine	PN 45E3793
Rack Mount Kit	PN 45E3785
Number of Tape Drives	1
Tape Cartridge Capacity	9
I/O Stations	1
Physical Capacity	LTO 3: Up to 3.6 TB (7.2 TB with 2:1 compression) LTO 4: Up to 7.2 TB (14.4 TB with 2:1 compression)
Data Transfer Rate	LTO 3: Up to 60 MBps LTO 4: Up to 120 MBps
Attachment and Systems Support	The TS2900 supports 3 Gbps SAS attachment to IBM Power Systems, IBM System x, Intel, and other open systems server platforms.

- TS2900 Tape Autoloader Express details on PartnerWorld
- TS2900 Tape Autoloader Express details on IBM.com
- TS2900 Tape Autoloader Express competitive info on COMP

Figure T.6. IBM System Storage TS2900 Tape Autoloader Express at a glance (and links to more detail).

TS3100 Tape Library Express

The IBM System Storage TS3100 Tape Library Express Model (Figure T.7) and its storage management applications are designed to address capacity, performance, data protection, reliability, availability, affordability, and application requirements. It is designed as a functionally rich, entry tape-storage solution incorporating LTO Ultrium tape technology. The IBM TS3100 Express model is an excellent solution for large-capacity or high-performance tape backup with or without random access. The TS3100 is also an excellent choice for tape automation for IBM System p, IBM System i, IBM System x, and other open systems.

The IBM TS3100 Tape Library Express is well-suited for handling backup, save and restore, and archival data-storage needs for small to medium-size environments. With the use of one LTO tape drive and 24 tape cartridge capacity, the IBM TS3100 model is designed to take advantage of LTO technology to cost-effectively handle growing storage requirements. The TS3100 Tape Library is configured with two removable cartridge magazines, one on the left side (12 data cartridge slots) and one on the right (12 data cartridge slots). Additionally, the left magazine includes a single mail slot to help support continuous library operation while importing and exporting media. A barcode reader is standard in the library, supporting the library's operation in sequential or random access mode. The TS3100 also comes standard with remote management capabilities to allow for remote administration of the tape library through a Web interface.

Here are some quick TS3100 facts:

Specifications

Drive options	Ultrium 4: LVD SCSI—FC (8143); 4 Gbps Fibre Channel—FC (8144); 3 Gbps SAS—FC (8145) Ultrium 3: LVD SCSI—FC (8043); 4 Gbps Fibre Channel—FC (8044)
Available Model	3573 L2U - IBM TS3100 Tape Library w/o Drive (PN 35732UL)
Tape drive type	IBM LTO Ultrium 4 or IBM LTO Ultrium 3
Number of drives	1
Number of tape cartridges	24
Number of mail slots	1
Physical capacity	Up to 1.6 TB per cartridge compressed; 800 GB native with LTO 4 Up to 800 GB per cartridge compressed; 400 GB native with LTO 3 Up to 38.4 TB per tape library compressed; 19.2 TB native with LTO 4 Up to 19.2 TB per tape library compressed; 9.6 TB native with LTO 3
Data transfer rate	Up to 120 MBps native with LTO Ultrium 4 Up to 80 MBps native with LTO Ultrium 3
Attachment and systems support	The TS3100 features LVD Ultra160, 4 Gbps Fibre Channel and 3 Gbps SAS (LTO4 only) interfaces, attaching to IBM System p, IBM System i, IBM System x, RS/6000 SP, AS/400, and IBM Netfinity systems, and non-IBM servers, workstations, and personal computers
Operating systems	Native device-driver support is available for IBM AIX, IBM OS/400, IBM i5/OS, Windows 2000, Windows Server 2003, Sun Solaris, HP-UX, Red Hat, and United Linux

- TS3100 Express details on PartnerWorld
- TS3100 Express details on IBM.com
- TS3100 Express competitive info on COMP

Figure T.7. IBM System Storage TS3100 Tape Library Express at a glance (and links to more detail).

- Designed to support the new IBM LTO Ultrium 4 and the LTO Ultrium 3 Tape Drives for increased capacity and performance including 4 Gbps fibre channel, Low Voltage Differential (LVD) SCSI, and 3 Gbps SAS attachment
- Designed to support cost-effective backup, save and restore, and archival storage in sequential or random access mode with a standard bar-code reader
- IBM Ultrium 4 technology is designed to support encryption of data with 3 Gbps SAS and continues to support write once, read many (WORM) operations
- Designed to offer outstanding capacity, performance, and reliability for midrange and network tape-storage environments in a 2U form factor with 24 data cartridge slots and a mail slot
- Remote library management through a standard Web interface supports flexibility and greater administrative control of storage operations.

TS3100 Tape Library Express HH Model

The IBM System Storage TS3100 Tape Library Express Model featuring half-high Ultrium technology (Figure T.8) and its storage management applications are designed to address capacity, performance, data protection, reliability, availability, affordability, and application requirements. It is designed as a functionally rich entry tape storage solution incorporating LTO Ultrium tape technology. The IBM TS3100 Express model featuring half-high Ultrium technology is an excellent solution for large-capacity or high-performance tape backup with or with-

Specifications

Drive options	Ultrium 3 half-high: LVD SCSI (95P4998); 3 Gbps SAS (95P5000) Ultrium 4 half-high: 3 Gbps SAS (45E2243)
Available models	3573 L2U TS3100 Tape Library w/o Drive (PN 35732UL)
Rack mount	23R6998
Right-side magazine set	23R6999
Left-side magazine set	45E3327
Tape drive type	IBM LTO Ultrium 3 half-high; IBM LTO Ultrium 4 half-high
Number of drives	1-2
Number of tape cartridges	24
Number of mail slots	1
Physical capacity	Up to 1.6 TB per cartridge compressed; 800 GB native Up to 38.4 TB per tape library compressed; 19.2 TB native
Data transfer rate	Up to 120 MBps native with LTO Ultrium 4 half-high Up to 60 MBps native with LTO Ultrium 3 half-high
Attachment and systems support	IBM System p, IBM System i, IBM System x, HP-UX, Sun Solaris, UNIX, Linux, and Windows servers, and non-IBM servers, workstations, and personal computers that support the interface specifications

- TS3100 Express half-high details on PartnerWorld
- TS3100 Express half-high details on IBM.com
- TS3100 Express half-high competitive info on COMP

Figure T.8. IBM System Storage TS3100 Tape Library Express model featuring half-high Ultrium 3 technology at a glance (and links to more detail).

out random access. The TS3100 featuring half-high Ultrium technology is also an excellent choice for tape automation for IBM System p, IBM System i, IBM System x, and other open systems.

Here are some quick TS3100 HH facts:

- Designed to support the new IBM LTO Ultrium 4 Half-High (HH) Tape Drive and the IBM LTO Ultrium 3 HH Tape Drive, to help increase capacity and performance with Low Voltage Differential (LVD) SCSI and 3 Gb Serial Attached SCSI (SAS) attachments
- Designed to support cost-effective backup, save and restore, and archival storage in sequential or random access mode with a standard barcode reader
- Designed to offer outstanding capacity, performance, and reliability for midrange and network tape-storage environments in a 2U form factor with 24 data cartridge slots and a mail slot
- Remote library management through a standard Web interface supports flexibility and greater administrative control of storage operations
- IBM Ultrium 4 technology is designed to support encryption of data with 3 Gbps SAS and continues to support write once, read many (WORM) operations.

TS3200 Tape Library Express

The IBM System Storage TS3200 Tape Library Express Model (Figure T.9) is designed to offer high capacity and performance technology for the midrange open systems environ-

Specifications

Available model	3573 L4U - TS3200 Tape Library w/o Drive (PN 35734UL)
Drive options	Ultrium 4: LVD SCSO-FC (8143); 4 Gbps Fibre Channel - FC (8044)
Number of mail slots	3
Capacity	Up to 1.6 TB per cartridge compressed; 800 GB native with LTO 4 Up to 800 GB per cartridge compressed; 400 GB native with LTO 3 Up to 76.8 TB per tape library compressed; 38.4 TB native with LTO 4 Up to 38.4 TB per tape library compressed; 19.2 TB native with LTO 3
Data transfer rate	Up to 120 Mbps native with LTO Ultrium 4 Up to 80 Mbps native with LTO Ultrium 3
Attachment and systems support	The TS3200 features LVD Ultra160 and 3 Gbps SAS (LTO 4 only) interfaces, attaching to IBM System p and System p5, pSeries, IBM System i and System i5, iSeries, IBM System x, IBM RS/6000 SP, IBM AS/400, IBM BladeCenter, and IBM Netfinity systems, and non-IBM servers, workstations, and personal computers
Operating systems support	Native device driver support is available for IBM AIX, IBM OS/400, IBM i5/OS, Windows 2000, Windows Server 2003, Sun Solaris, HP-UX, Red Hat, and United Linux

- TS3200 Express details on PartnerWorld
- TS3200 Express details on IBM.com
- TS3200 Express competitive info on COMP

Figure T.9. IBM System Storage TS3200 Tape Library Express at a glance (and links to more detail).

ments. The TS3200 Tape Library is an external 4U standalone or rack-mountable unit that incorporates up to two Linear Tape-Open (LTO) IBM TotalStorage Ultrium 4 or 3 tape drives. The new LTO Ultrium 4 tape drive has a native data rate of up to 120 Mbps per drive.

The IBM System Storage TS3200 Tape Library Express Model is an excellent tape storage solution for organizations with existing digital linear tape or requiring high-performance automated tape backup. The TS3200 is also designed for organizations that have limited physical space in their IT environments. Operating in a rack environment allows organizations the advantage of placing the TS3200 in a standard 19-inch rack, which provides 76.8 TB of compressed tape storage in just a 4U space.

Here are some quick TS3200 facts:

- Available with one or two Ultrium 4 or Ultrium 3 Tape Drives with either Low Voltage Differential (LVD) SCSI, 4 Gbps Fibre Channel or 3 Gbps SAS (LTO 4 only) attachment
- Configured to hold four removable magazines, providing 48 data cartridges, including a three-slot I/O station
- Standard bar code reader and remote management unit to give the user greater flexibility in deployment and operation
- Removable cartridge magazines support quick bulk load of the tape library as well as ease of storage for media
- Ultrium WORM cartridges are supported with the IBM Ultrium Tape Drives
- Standalone or rack-mountable

- Path failover can now be ordered via HVEC.

TS3200 Tape Library Express HH Model

The IBM System Storage TS3200 Tape Library Express Model (Figure T.10), featuring half-high technology, and its storage management applications are designed to address capacity, performance, data protection, reliability, availability, affordability, and application requirements. It is designed as a functionally rich, entry tape-storage solution incorporating LTO Ultrium tape technology. The IBM TS3200 Express model is an excellent solution for large-capacity or high-performance tape backup with or without random access. The TS3200 featuring half-high Ultrium technology is also an excellent choice for tape automation for IBM System p, IBM System i, IBM System x, and other open systems.

The IBM TS3200 Tape Library Express featuring half-high Ultrium technology is well-suited for handling backup, save and restore, and archival data storage needs for small to medium-size environments. With the use of up to four LTO Half-High Tape Drives and 48 tape cartridge capacity, the IBM TS3200 HH model is designed to use LTO technology to cost-effectively handle growing storage requirements. The TS3200 Tape Library is configured with four removable cartridge magazines, two on the left side (24 data cartridge slots) and two on the right (24 data cartridge slots). Additionally, the lower left magazine includes a three-slot I/O station to help support continuous library operation while importing and exporting media. A bar code reader is standard in the library, supporting the library's operation in sequential or random access

Specifications

Drive options	Ultrium 3 half-high: LVD SCSI (95P4998); 3 Gbps SAS (95P5000) Ultrium 4 half-high: 3 Gbps SAS (45E2243)
Available Model	3573 L4U - TS3200 Tape Library w/o Drive (PN 35734UL)
Rack mount	23R6998
Right-side magazine set	23R6999
Left-side magazine, upper	45E2225
Left-side magazine, lower	45E2231
Tape drive type	IBM LTO Ultrium 3 half-high; IBM LTO Ultrium 4 half-high
Number of drives	1-4
Number of tape cartridges	48
Number of mail slots	3
Physical capacity	Up to 1.6 TB per cartridge compressed; 800 GB native Up to 76.8 TB per tape library compressed; 38.4 TB native
Data transfer rate (per drive)	Up to 120 MBps native with LTO Ultrium 4 half-high Up to 60 MBps native with LTO Ultrium 3 half-high

- TS3200 Express half-high details on PartnerWorld
- TS3200 Express half-high details on IBM.com
- TS3200 Express half-high competitive info on COMP

Figure T.10. IBM System Storage TS3200 Tape Library Express model featuring half-high Ultrium 3 technology at a glance (and links to more detail).

mode. The TS3200 also comes standard with remote management capabilities to allow for remote administration of the tape library through a Web interface.

Here are some quick TS3200 facts:

- Designed to support the new IBM Linear Tape-Open (LTO) Ultrium 4 Half-High (HH) Tape Drive and the IBM LTO Ultrium 3 HH Tape Drive, to help increase capacity and performance with Low Voltage Differential (LVD) SCSI and 3 Gb Serial Attached SCSI (SAS) attachments
- Designed to support cost-effective backup, save and restore, and archival storage in sequential or random access mode with a standard bar code reader
- IBM Ultrium 4 technology is designed to support encryption of data with 3 Gbps SAS and continues to support write once, read many (WORM) operations
- Designed to offer outstanding capacity, performance, and reliability for midrange and network tape-storage environments in a 4U form factor with 48 data cartridge slots and a mail slot
- Remote library management through a standard Web interface supports flexibility and greater administrative control of storage operations.

TS3310 Tape Library

The IBM System Storage TS3310 Tape Library (Figure T.11) is a modular, scalable tape library designed to address the tape storage needs of rapidly growing companies who find themselves space and resource constrained with tape backup and

Specifications

Machine Type/Model	**3576 Model L5B**	**3576 L5B and four E9U models**
Configuration	Base library	Base library and 4 expansion units
LTO storage slots (max)	35	403
LTO input/output slots (max)	6	54
Maximum tape drives	2	18
Total physical capacity (2:1 compression)	56 TB	up to 644.8 TB
Capacity on demand increments	N/A	46 cartridges
Maximum logical libraries	2	18

- TS3310 details on PartnerWorld
- TS3310 details on IBM.com
- TS3310 competitive info on COMP

Figure T.11. IBM System Storage TS3310 Tape Library at a glance (and links to more detail).

other tape applications.Designed around a 5U high modular base library unit, the TS3310 is designed to scale vertically with expansion for LTO tape cartridges, drives, and redundant power supplies. The base library module, model L5B, is the entry point for the product family. It contains all of the necessary robotics and intelligence to manage the 5U high library system, which houses up to 41 cartridges (35 storage slots and 6 input/output slots) and two LTO generation 4 and/or generation 3 tape drives.

Here are some quick TS3310 facts:

- Modular, scalable tape library designed to grow as your needs grow
- Available in desktop, deskside, and rack mounted configurations
- Designed for optimal data storage efficiency with high cartridge density using standard or WORM LTO data cartridges
- Hot-swap tape drives and power supplies
- Redundant power and host path connectivity failover options
- Remote Web-based management and SMI-S interface capable.

TS3400 Tape Library

The IBM System Storage TS3400 Tape Library (Figure T.12) offers the high capacity and performance advantage of the IBM System Storage TS1130 or TS1120 Tape Drives in a smaller automation footprint for IBM Power Systems, System x, System z, and other open systems environments. The

Specifications

Tape drive	TS1130 or TS1120 tape drives
Number of drives	Up to 2, no intermix of TS1130 and TS1120
Number of tape cartridges	Up to 18
Number of input/output slots	Up to 3
Number of logical libraries	Up to 2
Capacity	Up to 18 TB native capacity (54 TB with 3:1 compression)
Data transfer rate	Up to 320 MBps
Media type	IBM 3592 JA/JB/JJ and JW/JR/JX write once read many (WORM) cartridges
Operating system	IBM OS/400, IBM i5/OS, AIX, and Linux IBM z/OS, IBM z/VM, IBM VSE/ESA and Linux, HP-UX, Solaris, Windows

- TS3400 details on PartnerWorld
- TS3400 details on IBM.com
- TS3400 competitive info on COMP

Figure T.12. IBM System Storage TS3400 Tape Library at a glance (and links to more detail).

TS3400 tape library is an external 5U standalone or rack-mountable unit supporting one or two TS1130 tape drives with a data transfer rate of up to 160 MBps per drive or one to two TS1120 tape drives with a data transfer rate of up to 104 MBps per drive.

The TS3400 tape library is an excellent tape storage solution for organizations already using IBM enterprise tape drives in their data centers who want to use the same technology in remote locations. The TS3400 is also designed for organizations that have limited physical space in their IT environments. The TS3400 can be installed in a standard 19-inch rack, providing up to 54 TB of compressed tape storage in a 5U space.

Here are some quick TS3400 facts:

- Control path and data path automatic failover features are designed to keep data available
- Supports information retention using the high capacity and attractive performance of TS1130 or TS1120 tape drives in a smaller automation footprint
- Satisfies regulatory compliance requirements with support for non-erasable, non-rewritable cartridges
- Provides information security with support for encryption.

TS3500 Tape Library

The IBM System Storage TS3500 Tape Library (Figure T.13) combines IBM automation technology and high-performance

Specifications

Tape drive types	TS1130, TS1120, or 3592 tape drives or IBM LTO Ultrium 4, 3, or 2 tape drives
Number of frames	One base frame, up to 15 expansion frames The TS3500 Model HA1 installation provides one of the two additional frames required as service bays in a dual accessory library
Number of drives	Up to 12 per frame (up to 192 per library)
Number of Input/Output slots	Up to 224 (16 I/O slots standard)
Number of logical libraries	Maximum of 192 (up to number of drives installed)
Number of 3953 Systems	Maximum of 4 per TS3500 subsystem
Number of TS7700 Capacity	Maximum of 8 per TS3500 subsystem IBM Ultrium 4 Cartridges: up to 5.5 PB (up to 11 PB with 2:1 compression) 3592 extended capacity cartridges: up to 6.2 PB (18.6 PB with 3:1 compression)
Media type	L23/D23/S23: IBM 3592 JA/JJ/JB and JW/JR/JX write once read many (WORM) cartridges
Operating systems support	Device driver support is available for IBM AIX, IBM OS/400, IBM i5/OS, Windows 2000, Windows Server 2003, Linux, Sun Solaris, and HP-UX

- TS3500 details on PartnerWorld
- TS3500 details on IBM.com
- TS3500 competitive info on COMP

Figure T.13. IBM System Storage TS3500 Tape Library at a glance (and links to more detail).

IBM tape drives to deliver a robust storage solution for open systems and System z mainframes.

Native 4 Gbps Fibre Channel attached TS1040 tape drives are designed to provide up to 50 percent improvement in tape drive performance over the third-generation LTO Ultrium drives. The fourth-generation LTO Ultrium is designed to support up to 120 MBps native data-transfer rates. The TS1130 tape drives are designed to provide up to a 60 percent improvement in tape drive performance over the TS1120 tape drives. The third-generation 3592 drive is designed to support up to 160 MBps native data-transfer rates.

To meet the highest standards for availability, the TS3500 tape library supplements proven technology with redundancy, including redundant control paths, grippers, power supplies, and AC feeds. Automatic control path and data path failover further support continuity and accelerate disaster recovery.

Retention capability is further improved with support for WORM (Write Once Read Many) tapes. WORM-capable cartridges give you the option of storing vital data in a non-erasable, non-rewritable format, to meet strict regulatory requirements for data retention.

To keep information confidential if backup tapes are lost or stolen, the TS3500 tape library supports TS1130, TS1120, and TS1040 tape drive encryption. These tape drives include data encryption capabilities within the drives, helping to avoid the need for host-based data encryption.

Here are some quick TS3500 facts:

- Supports scalable, automated data retention utilizing high-capacity IBM System Storage tape drives

- Enhances data availability and library reliability with optional dual library accessor
- Provides data security and regulatory compliance via support for tape drive encryption and WORM cartridges.

IBM ProtecTIER Deduplication Solutions

IBM ProtecTIER Deduplication Solutions (Figure T.14), featuring revolutionary and patented HyperFactor data deduplication technology, provide enterprise-class performance, scalability, and proven enterprise-level data integrity to meet

- ProtecTIER details on PartnerWorld
- ProtecTIER Sales Kits on PartnerWorld
- ProtecTIER details on IBM.com
- ProtecTIER competitive info on COMP

Figure T.14. IBM System Storage ProtecTIER Deduplication at a glance (and links to more detail).

the disk-based data protection needs of the data center while enabling significant infrastructure cost reductions.

IBM ProtecTIER deduplication solutions provide:

- High speed backups—With performance of up to 1000 MB/s or more sustained inline deduplication
- Storage capacity reduction—Deduplication reduces backup disk storage capacity requirements up to 25 times or more
- Investment protection—Meets today's requirements and can easily scale to 1 PB of physical storage that can store up 25 PB or more backup data
- Data integrity—Non-hash-based approach avoids possibility of data loss due to hash collision
- Non-disruption—Inline approach ensures backup windows are met and existing operations are not disrupted
- Production proven—Tested and proven in hundreds of production environments around the globe
- Native replication—Deduplication and replication combined to improve disaster recovery operations by enabling more data to be protected at a lower cost
- Stability—IBM owns ProtecTIER and is committed to providing continuous R&D to develop and deliver innovative and timely solutions to meet your data protection challenges.

Combining Deduplication and Replication Technologies

ProtecTIER's native replication technology enables virtual tape cartridges to be replicated to a remote location for enhanced disaster recovery and business continuity. By eliminating the need to transport physical tape cartridges, data can be recovered faster and more reliably, enabling systems to get back online quicker in the event of a disaster or major system outage.

ProtecTIER native replication technology provides:

- Dramatic improvements in disaster recovery operations through automated electronic replication of data to a remote DR site
- Replication leverages deduplication technology in the disk repositories at both the primary and secondary sites to lower bandwidth requirements
- Greatly reducing bandwidth lowers overall costs and enables more applications and data to be protected with replication
- Inline deduplication enables replication to occur concurrently with backup operations, increasing responsiveness and the ability to restore data quickly when needed
- Replicated "virtual" tape cartridges can then be cloned to physical tape at a remote site to eliminate the need to transport physical tapes and the associated security risks.

Virtualization Engine TS7700

The IBM Virtualization Engine TS7700 (Figure T.15) is a family of mainframe virtual-tape solutions that are designed to opti-

Specifications

	Single Node	2 Cluster GRID
Native tape volume cache (TB)	Up to 70	Up to 140
Virtual drives	256	512
Virtual volumes	1,000,000	1,000,000
FICON channels	4	8
Warranty	1 year onsite repair	–
Width	644 mm (25.4 in)	
Depth	1102 mm (43.4 in)	
Height	1804 mm (71.0 in)	
Weight	565.6 kg (1247 lb)	
Supported environments	IBM z/OS v1.9 or higher IBM z/VM v5.3 or higher IBM z/VSE V4.1 or higher IBM z/TPF 4.1 or higher	
	3 Cluster GRID	**4 Cluster GRID**
Native tape volume cache (TB)	Up to 210	Up to 280
Virtual drives	768	1024
Virtual volumes	1,000,000	1,000,000
FICON channels	12	16
Warranty	–	–

- TS7700 details on PartnerWorld
- TS7700 details on IBM.com
- TS7700 competitive info on COMP

Figure T.15. IBM Virtualization Engine TS7720 at a glance (and links to more detail).

Specifications

	Single Node	**2 Cluster GRID**
Native tape volume cache (TB)	Up to 14	Up to 28
Virtual drives	256	512
TS1100 or 3592 tape drives	4 to 16	8 to 32
Virtual volumes	1,000,000	1,000,000
FICON channels	4	8
Warranty	1 year onsite repair	
Width	644 mm (25.4 in)	
Depth	1102 mm (43.4 in)	
Height	1804 mm (71.0 in)	
Weight	565.6 kg (1247 lb)	
Supported environments	IBM z/OS v1.9 or higher IBM z/VM v5.3 or higher IBM z/VSE V4.1 or higher IBM z/TPF 4.1 or higher	
	3 Cluster GRID	**4 Cluster GRID**
Native tape volume cache (TB)	Up to 42	Up to 56
Virtual drives	768	1024
TS1100 or 3592 tape drives	12 to 48	16 to 64
Virtual volumes	1,000,000	1,000,000
FICON channels	12	16

- TS7700 details on PartnerWorld
- TS7700 details on IBM.com
- TS7700 competitive info on COMP

Figure T.15. IBM Virtualization Engine TS7740 at a glance (and links to more detail). *(Continued from previous page)*

mize tape processing. With one solution, the implementation of a fully integrated tiered storage hierarchy of disk and tape leverages the benefits of both technologies to help enhance performance and provide the capacity needed for today's tape processing requirements. Deploying this innovative subsystem can help reduce batch processing time, total cost of ownership, and management overhead.

IBM offers two models of the TS7700 Virtualization Engine. The TS7740 Virtualization Engine supports attachment to and exploits the performance and capacity of the IBM System Storage TS1130 and TS1120 Tape Drives or the IBM TotalStorage 3592 Model J1A Tape Drive installed in an IBM System Storage TS3500 Tape Library or IBM TotalStorage 3494 Tape Library. Support for these tape drives may help to reduce the number of cartridges and the size of the library by allowing the storage of up to 3 TB on a single 3592 JB cartridge, assuming 3:1 compression.

Here are some quick TS7700 facts:

- Can help reduce costs such as power, maintenance, operations, and support staff
- Can help automate and simplify IT operations using advanced policy management
- Supports business continuity through GRID connectivity and automated replication
- TS7740 can help accelerate backups and recalls by using a tiered hierarchy of disk and tape to make more efficient use of tape drives

- TS7720 provides a cache-centric solution for frequently accessed data.

7206 Model 336 Tape Drive

The IBM 7206 Model 336 External DAT72 (Figure E.1) Tape Drive is designed to be a cost-effective tape drive featuring the popular DAT72 (DDS) tape technology. It is designed to offer improved data quality and performance and increased capacity compared to the IBM 7206 Model 220. The 7206 Model 336 supports a migration path to greater tape storage capacity at a price point similar to IBM 7206-220 DDS4 tape drives.

The 7206 Model 336 tape drive is designed to achieve a media capacity up to 72 GB with 2:1 data compression, nearly twice the capacity of the previous IBM 7206-220 DDS4 tape drive. The 7206 Model 336 is also designed to offer a sustained data transfer rate of up to 6 MB per second or 21 GB per hour.

Here are some quick 7206 Model 336 facts:

- DAT72 physical capacity of up to 36 GB is nearly twice the capacity of DDS-4 tape drives
- Designed for improved data rate compared to IBM 7206 Model 220
- Designed for read and write compatibility with previous generation 4 mm tape media
- Designed for compatibility with tape storage devices used internally on IBM System p and IBM System i servers.

Specifications

Warranty	24x7, one year, IBM onsite repair
Media	DAT72 (DDS Gen 5)
Native capacity	36 GB per cartridge
Compressed capacity	72 GB per cartridge
Data transfer rate	3 MBps (6 MBps with compression)
Interface	Ultra2 SCSI LVD (68-pin), Ultra3 SCSI LVD (68-pin), Ultra320 SCSI LVD (68-pin)

- 7206 Model 336 details on PartnerWorld
- 7206 Model 336 details on IBM.com
- 7206 Model 336 competitive info on COMP

Figure E.1. IBM 7206 Model 336 External DAT72 Tape Drive at a glance (and links to more detail).

7207 External Tape Drive

The IBM 7207 Model 330 30 GB External SLR60 Tape Drive (Figure E.2) can be an excellent low-cost solution if you use quarter-inch-cartridge tape format for save and restore of your data. The IBM TotalStorage 7207 Model 330 External SLR60 Tape Drive is designed to offer improved capacity, performance, and data reliability for IBM eServer iSeries/AS400 and pSeries RS6000 servers. Its LED and messaging features are similar to other external tape drive products on these servers.

To help protect the data availability of tapes written by older generation QIC drives, the 7207 Model 330 is designed to be capable of reading and writing tapes written on other systems that use SLR100, MLR3, and MLR1 tape formats; it is read-only compatible with SLR5 and DC9250 media. All this adds up to a flexible and cost-effective backup, restore, and archiving solution that can help provide an easy migration path to greater tape storage capacity. And since many iSeries and AS/400 customers use QIC technology as their internal tape drive, the 7207 Model 330 offers additional compatibility across that entire platform. The 7207 Model 330 can be used as a small, desktop save and restore tape drive, or in an IS facility up to 15 meters from the server. The Model 330 can also be located in a rack using the IBM rack mount feature (FC 8723).

Here are some quick 7207 facts:

- Designed to offer increased capacity of 30 GB (60 GB when compressed) per cartridge, a 7x capacity over its predeces-

Specifications

Capacity per cartridge (two options)	Up to 30 GB native; Up to 60 GB compressed (Part Number: 14P4209) Up to 5 GB native; Up to 10 GB compressed (Part Number: 35L0661)
Data transfer rate	Up to 4 MB/sec native; Up to 8 MB/sec compressed
Media	SLR (QIC)
Interface	SCSI Ultra2 LVD (68-pin)
Software requirements	
pSeries/RS6000	IBM AIX 4.3.3, AIX 5L Version 5.1, AIX 5L Version 5.2 or later
iSeries/AS400	V5R1 or later
User-ready configuration	The 7207 Model 330 includes one SLR60 drive in a black enclosure that contains power and cooling, and the following components: SCSI cable and power cord (specify), and SCSI terminator SLR60 data cartridge (may be used for initial drive testing or data storage) SLR (QIC) cleaning cartridge Safety, installation, and service guides

- 7207 Model 330 details on PartnerWorld
- 7207 Model 330 details on IBM.com
- 7207 Model 330 competitive info on COMP

Figure E.2. IBM 7207 Model 330 External Tape Drive at a glance (and links to more detail).

sor IBM TotalStorage 7207 Model 122 Tape Drive at a similar price point

- Sustained data rate of 4 MB/sec native and 8 MB/sec compressed
- Compatibility with 7207 Model 122 Tape Drives used on IBM eServer iSeries/AS400, IBM eServer pSeries/RS/6000 servers, and most iSeries/AS400 internal QIC drives.

7212 Storage Device Enclosure Express

The IBM System Storage 7212 Storage Device Enclosure Express Model features the latest technology options in tape drives and a DVD-RAM optical drive. The 7212 Express Model packaging is a low-profile, modular design that is an excellent choice for rack-mount or limited space desktop applications. The 7212 Express Model offers customers a variety of choices for storage drives in either rack-mountable 1U or desktop configurations.

More on the Web

- 7212 Enclosure Express details on PartnerWorld
- 7212 Enclosure Express details on IBM.com
- 7212 Enclosure Express competitive info on COMP

Here are some quick 7212 Enclosure facts:

- Features a compact design that can be configured with up to two storage devices
- Can be configured for one EIA unit (1U) of a standard 19-inch server rack or as a low-profile desktop solution

- Offers several storage device options for both tape drives and optical drives
- Low-profile storage solution for environments in which cabling space and server storage bays are limited
- Connects to IBM System i and System p workstations and servers.

7214 Storage Device Enclosure

The IBM System Storage 7214 Storage Device Enclosure features the latest technology options in tape drives and DVD optical drives. The 7214 Storage Enclosure is a low-profile design that is an excellent choice for mounting in your System p 19-inch rack.

The 7214 storage enclosure is a one EIA (1U) design that features two drive bays that can hold one tape drive, a slim design DVD-RAM drive, and a DVD-ROM optical drive for a total of up to three drives. The 7214 storage device enclosure may also feature two tape drives. No more than two DVD drives may be featured in a single enclosure. Connection of the 7214 enclosure to System p requires the PCI-X DDR Dualx4 SAS Adapter (Feature #5900). Up to two 7214 enclosures may be attached to this adapter. The new Serial SCSI electronic bus featured in the 7214 helps potentially provide higher through-put of drive data exchange on your System p server.

More on the Web

- 7214 Enclosure details on PartnerWorld
- 7214 Enclosure details on IBM.com
- 7214 Enclosure competitive info on COMP

Here are some quick 7214 Enclosure facts:

- Features a 1U rack mountable easy-to-install design that can be configured with up to three storage devices
- Offers storage device options for both tape and DVD optical drives
- Provides performance enhancements with the new Serial SCSI interface and a control card sensor to track hardware function
- Connects to high performance IBM System p servers.

Archive and Retention Products

In this section, we explore IBM System Storage products that employ a combination of disk and tape storage to address business needs.

DR550

The IBM System Storage DR550 (Figure A.1) is designed to help businesses meet the growing challenge of managing and protecting business information with operational efficiency. Information growth poses a challenge for companies, and archiving inactive or just-in-case (JIC) data off the primary storage to a DR550, which uses low-cost disk, tape, and optical media, can help reduce the administrative burden of backing up and managing primary storage and leverage higher cost storage assets more effectively. Retaining business information on the DR550 reduces the cost of storing data over

Model DR1

Model DR2

Specifications

Model DR1	IBM 25U high rack — Rack security feature — Power control assembly (PCA) Single IBM System p5 POWER5+ server running AIX, Version 5.3 Starting capacity: .88 TB, with 8 TB increments Maximum capacity supported: 48.88 TB raw (For more information on usable capacity contact your IBM representative or IBM Business Partner) RAID Level 5 or Raid Level 6 IBM System Storage Archive Manager, Version 5.5.0 IBM System Storage DR550 File System Gateway (optional)
Model DR2	IBM 36U high rack — Rack security feature — Power control assemblies (PCAs) Single or Dual IBM System p5 POWER5+ server running AIX, Version 5.3 — IBM HACMP 5.3 (Dual-server configuration) IBM System Storage Archive Manager, Version 5.5.0 IBM System Storage SAN 16B-2 Fibre Channel switch Starting capacity: 8 TB, with 8 TB increments Maximum capacity supported: 224 TB raw RAID Level 5 or Raid Level 6 IBM System Storage DR550 File System Gateway (optional)
Optional systems	Tape Systems: LTO Gen 3 or Gen 4, TS1120, many others Optical systems: IBM 3996, others DR550 Single Node systems support IPv6

- DR550 details on PartnerWorld
- DR550 details on IBM.com
- DR550 competitive info on COMP

Figure A.1. IBM System Storage DR550 at a glance (and links to more detail).

the long term and provides an alternative level of data protection.

The DR550 is designed to provide advanced storage management technology to enable the management and enforcement of data retention policies. It is well-suited for archiving a broad range of electronic records, including email, digital images, database applications, instant messages, account records, contracts, insurance-claim documents, and other types of storage records. The DR550's policy-based, archive data retention capabilities are designed to support non-erasable, non-rewritable data storage and help address the needs of regulated industries and other businesses with long-term data retention and protection requirements. The optional DR550 FileSystem Gateway offers file-based archiving with the DR550 and is designed to provide an NFS and CIFS file system interface to applications.

Here are some quick DR550 facts:

- Repository for all kinds of content—structured and unstructured
- Policy-based and event-based data management protects information against intentional or accidental deletions or modifications
- Maintains data as non-erasable and non-rewritable until deletion is permitted by retention policy
- Scales up to 224 TB with disk and petabytes with attached tape

- Offers low TCO by using multiple storage tiers (disk, tape, optical) within an archive
- Enhanced security and protection with disk and tape encryption options
- Deletion Hold feature to retain content for legal or audit reasons
- Supports major archiving applications
- Award winning and industry proven.

Information Archive

IBM Information Archive (Figure A.2) is the next-generation information retention solution designed as a universal archiving repository for all types of content to help midsize and enterprise clients reduce costs, manage risk, and address their complete information retention needs—business, legal, or regulatory. This highly versatile, cloud-ready, Smart Business System can help minimize your business risk and support regulatory compliance by providing a secure and protected storage repository.

IBM Information Archive is designed to help reduce the need and expense for primary storage by enabling archiving applications to move less-active but business vital information off the primary storage tier to a cost-effective and scalable "archive" storage tier, helping to reduce information infrastructure costs immediately. In addition, the Information Archive enforces policies across a single repository that may combine both disk and multiple tape systems that scale to

Specifications

General IA Ingest—General Parallel File System (GPFS) Node	2U System x server, two quad-core processors, 24 GB memory, 2 x Dual Ported Fibre Channel (FC) Host Bus Adapter (HBAs), four 1 GB copper Ethernet ports, Redundant 146 GB 15K rpm Serial Attached SCSI (SAS), Optional: Dual ported 1 Gb fibre Ethernet card (for Fibre customer infrastructure), Up to 3 nodes per cluster
Management node	1U System x server, one quad-core processor, 4 GB memory, Ethernet daughter card (4 ports total on planar and daughter), Optional: Dual ported 1 Gb fiber Ethernet card (for fibre customer infrastructure)
Private FC SAN Data Network	All disk controllers accessible to all Ingest/GPFS nodes, 4 Gb FC Storage Area Network (SAN) via 8 Gb capable FC switches, Dual-redundant 24-port FC switches, Private dual/redundant Ethernet network for management traffic (and later for indexing I/O traffic) with dual 24 port Ethernet switches
Redundant Array of Independent Disk (RAID) Controllers	System Storage mid range disk controller with 16 HDD/3u disk controllers with hardware remote mirroring support, Dual-redundant active/active RAID controllers in each disk controller, RAID 6 data protection, 2 GB cache per disk controller, 2 x 4 Gb FC ports per controller (for server access). 2 x 4 Gb FC ports per controller for remote mirroring, Serial Advanced Technology Attachment (SATA) 1 TB HDDs, 112 TB of raw capacity in rack 1, 2 x 96 TB raw in rack 2
Disk expansion drawers	System Storage Expansion Unit with up to 16 HDD/3u expansion—up to six per disk controller, SATA 1 TB HDDs

- Information Archive details on PartnerWorld
- Information Archive details on IBM.com
- Information Archive competitive info on COMP

Figure A.2. IBM Information Archive at a glance (and links to more detail).

petabytes in size. This combination can provide exceptionally low overall cost of ownership.

In order to meet the widest range of retention demands, IBM Information Archive allows IT administrators to customize retention policies based on unique and dynamically changing business requirements. An archiving strategy that helps optimize primary storage space can allow mission-critical applications to run faster, provide higher availability, and allow backup and recovery operations to be completed more quickly, thereby improving overall productivity.

Here are some quick Information Archive facts:

- Universal storage repository for all types of content, structured and unstructured, compliant and non-compliant
- Provides up to three customizable information collections per IBM Information Archive
- Provides up to three information protection levels offering maximum flexibility
- Stores information via multiple access methods
- Scales up to 304 TB (raw capacity)
- Maintains data integrity until deletion is permitted by retention policy and information protection level
- Enhanced security and protection with a data encryption option
- Helps optimize storage consumption with data deduplication and compression

- Offers low total cost of ownership (TCO) by allowing use of mixed media (disk and tape)
- Increases data security through patent-pending Enhanced Tamper Protection feature.

SAN Fabric

The growing importance of storage is fueling a model for storage infrastructures in which storage devices are not attached to a specific server but rather make up an independent storage area network, or SAN. The storage devices (disk arrays, tape drives, SVC, etc.) residing in a SAN are shared among a group of servers that reside on the same network.

In addition to storage devices and servers, IBM sells switches, directors, and routers used to build SAN fabrics. In this section, we look at these SAN fabric products. IBM SAN products and solutions provide integrated SMB and enterprise SAN solutions with multiple local, campus, metropolitan, and global storage networking options.

More on the Web

- SAN Fabric info on IBM.com

SAN Fabric Cross Reference by Business Size

In this section, you will find a list of SAN products organized by workload size (entry, midsize, and enterprise) to help you find the best solution for your client.

SAN Fabric for Entry-Level Workloads

Here is a list of SAN fabric products designed for entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product.

More on the Web

- SAN Fabric for the entry-level workloads

SAN24B-4 Express

Cisco MDS 9124 Express

SAN Fabric for Midsize Workloads

Here is a list of SAN fabric products designed for midsize workloads. Click on the links and you will jump to the section of this ebook that describes the product.

More on the Web

- SAN Fabric for the midsize workloads

SAN40B-4

SAN80B-4

Cisco MDS 9134

Cisco MDS 9222i

SAN Fabric for Enterprise Workloads

Here is a list of SAN fabric products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product.

More on the Web

- SAN Fabric for enterprise workloads

SAN256B

SAN384B

SAN768B

Cisco MDS 9513

Cisco MDS 9506

Cisco MDS 9509

San b-type Routers

IBM offers a line of SAN type-b routers which we will explore in this section.

SAN04B-R

The IBM System Storage SAN04B-R multi-protocol router provides Fibre Channel over IP and FCIP Tunneling Service for distance extension, which can enable cost-effective and manageable metro and global business continuity solutions. This extended distance connectivity can help create consolidated remote tape vaulting data protection plus metro mirror and global mirror disk-based, disaster-tolerant solutions. Since the introduction of storage area networks, customers have built multiple SAN networks (or islands) for different applications, often with fabric switch components from different manufacturers. Some islands were built by different departments within a company, while other islands resulted from mergers, acquisitions,

More on the Web

- SAN04B-R info on PartnerWorld
- SAN04B-R info on IBM.com

or reorganizations. Dissimilar SAN equipment with different capabilities or a desire to isolate important applications has constrained opportunities for enhanced infrastructure simplification and vital business continuity solutions.

Here are some quick SAN04B-R facts:

- Designed for high performance with 4 Gigabit per second (Gbps) Fibre Channel (FC) ports and hardware-assisted traffic processing for line-rate performance across Ethernet Internet Protocol (IP) ports
- Utilizes existing Internet, IP-based metropolitan area network (MAN) or wide area network (WAN) infrastructures for metro and global SAN extension for business continuity solutions
- Enables consolidation of storage area network (SAN) islands for infrastructure simplification without compromising security
- Hardware-based compression, large window sizes, and selective acknowledgement of IP packets designed to optimize performance of SAN extension over IP networks
- Eight virtual FCIP tunnels per IP port are enabled by the high-performance extension feature to help maximize scalability and utilization of MAN/WAN resources
- Integrated IBM System Storage SAN b-type (Brocade) switch management helps simplify installation and administration and helps provide fabric investment protection
- FICON Accelerator uses special emulation techniques to reduce or eliminate degradation for selected applications such as IBM z/OS Global Mirror (XRC) and tape pipelining.

SAN b-type Switches

The IBM System Storage and TotalStorage SAN b-type family provides entry and midrange switches and enterprise directors.

SAN24B-4 Express

The IBM System Storage SAN24B-4 Express fabric switch is designed specifically to address the needs of small to midsize SAN environments. It can be used to create a wide range of high-performance SAN solutions, from simple, single-switch configurations to larger, multi-switch configurations which support fabric connectivity and advanced business continuity capabilities. Infrastructure simplification solutions for IBM System x, BladeCenter, and IBM POWER Systems servers include storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity solutions include data protection with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software.

More on the Web

- SAN24B-4 Express info on PartnerWorld
- SAN24B-4 Express info on IBM.com

Here are some quick SAN24B-4 Express facts:

- Simple-to-use SAN switch with easy-to-install and easy-to-use features designed specifically for the needs of small to midsize environments
- Provides new levels of performance with 8 Gbps Fibre Channel (FC) technology

- "Ports on Demand" scalability from 8 to 16 to 24 ports
- Protect existing 4, 2, and 1 Gbps infrastructure investment while positioning for future technologies
- Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft Windows, Unix, Linux, and IBM AIX and OS/400 operating systems.

SAN40B-4

The IBM System Storage SAN40B-4 SAN fabric switch provides 24, 32, or 40 active ports and is designed for high performance with 8 Gbps link speeds and backward compatibility to support links running at 4, 2, and 1 Gbps link speeds. High availability features make it suitable for use as a core switch in midrange environments or as an edge switch in enterprise environments where a wide range of SAN infrastructure simplification and business continuity configurations are possible. IBM POWER Systems, System x, System z, and many non-IBM disk and tape devices are supported in many common operating system environments. Optional features provide specialized distance extension, dynamic routing between separate or heterogeneous fabrics, link trunking, FICON, performance monitoring, and advanced security capabilities.

More on the Web

- SAN40B-4 info on PartnerWorld
- SAN40B-4 info on IBM.com

Here are some quick SAN40B-4 facts:

- High port density design with up to 40 ports in an efficient, space saving 1U height

- Simple-to-use midrange and enterprise SAN fabric switch for IBM POWER Systems, System x, System z, and other server environments
- New levels of performance with 8 Gbps Fibre Channel (FC) technology
- Non-disruptive capacity activation from 24 to 32 to 40 ports with Ports on Demand scalability
- High availability with redundant, hot-swappable fans and power supplies, and non-disruptive software upgrades.

SAN80B-4

The IBM System Storage SAN80B-4 SAN fabric switch provides 48, 64, or 80 active ports and is designed for high performance with 8 Gbps link speeds and backward compatibility to support links running at 4, 2, and 1 Gbps link speeds. High availability features make it suitable for use as a core switch in midrange environments or as an edge switch in enterprise environments where a wide range of SAN infrastructure simplification and business continuity configurations are possible. IBM POWER Systems, System x, System z, and many non-IBM disk and tape devices are supported in many common operating system environments. Optional features provide specialized distance extension, dynamic routing between separate or heterogeneous fabrics, link trunking, FICON, performance monitoring, and advanced security capabilities.

More on the Web

- SAN80B-4 info on PartnerWorld
- SAN80B-4 info on IBM.com

Here are some quick SAN80B-4 facts:

- High port density design with up to 80 ports in an efficient, compact 2U height helps save rack space
- Robust midrange and enterprise SAN fabric switch for IBM POWER Systems, System x, System z, and other server environments
- Provides new levels of performance with 8 Gbps Fibre Channel (FC) technology
- Ports-on-Demand scalability supports non-disruptive capacity activation from 48 to 64 to 80 ports
- Designed to support high availability with redundant, hot-swappable fans and power supplies and non-disruptive software upgrades.

SAN b-type Directors

In this section, we will explore the SAN b-type directors.

SAN256B

The IBM Total Storage SAN256B is designed to provide outstanding performance, enhanced scalability, and a design ready for high-performance 4 Gbps, 8 Gbps, and 10 Gbps capable hardware and expanded capability features. The SAN256B is well suited to address enterprise SAN customer requirements for infrastructure simplification and improved business continuity. The SAN256B director

More on the Web

- SAN256B info PartnerWorld
- SAN256B info on IBM.com

interoperates with other members of the IBM TotalStorage SAN b-type and m-type families. It can be configured with a wide range of highly scalable solutions that address demands for integrated IBM System z and open system server enterprise SANs.

Here are some quick SAN256B facts:

- High availability with built-in redundancy designed to avoid single points of failure
- Highly scalable director with 16, 32, or 48 Fibre Channel (FC) ports per port switch blade and from 16 to 384 ports in a single domain
- Multiprotocol router blade with 16 FC ports and two Internet Protocol (IP) ports for SAN routing and distance extension over IP
- iSCSI blade enables servers to access storage over IP (Ethernet)
- 10 Gbps Fibre Channel blade provides extended distance ISL connectivity between directors over dark fibre or DWDM
- Fibre Channel switch blades support either 4, 2, and 1 Gbps link speeds or 8, 4, 2, and 1 Gbps link speeds
- Sixteen and 32 port switch blades support IBM FICON.

SAN384B

The IBM System Storage SAN384B fabric backbone is designed to be the premier platform for consolidation of your

More on the Web

- SAN384B info on PartnerWorld
- SAN384B info on IBM.com

data center connectivity, providing high-performance and highly available data networking. Providing new levels of performance with industry-leading 8 Gbps Fibre Channel (FC) technology, it is also one of the first members of the IBM System Storage b-type SAN family designed to exploit Brocade's new Data Center Fabric architecture.

The SAN384B interoperates with other members of the IBM System Storage b-type SAN family as well as other fabrics. As a member of the IBM System Storage family of b-type SAN products, the SAN384B is designed to participate in fabrics containing other b-type SAN devices manufactured by Brocade. This versatile hardware can serve as a new top tier (or backbone) in a complex fabric and provide connections to other b-type SAN directors, switches, and routers.

Here are some quick SAN384B facts:

- Drive new levels of performance with 8 Gbps Fibre Channel (FC) technology in a compact design
- Reduce total cost of ownership (TCO) through consolidation of network resources
- Protect your existing infrastructure investment while positioning for future technologies
- Manage your infrastructure with greater flexibility and scalability
- Unify the management framework for consolidated and virtualized resources

- Improve energy efficiency by combining higher bandwidth with reduced power consumption.

SAN768B

The IBM System Storage SAN768B fabric backbone is designed to be the premier platform for consolidation of your data center connectivity, providing high-performance and highly available data networking. Providing new levels of performance with industry-leading 8 Gbps Fibre Channel (FC) technology, it is also the first member of the IBM System Storage b-type family designed to exploit Brocade's new Data Center Fabric architecture. The SAN768B interoperates with other members of the IBM System Storage b-type and m-type families as well as other fabrics.

More on the Web

- SAN768B info on PartnerWorld
- SAN768B info on IBM.com

As a member of the IBM System Storage family of b-type products, the SAN768B is designed to participate in fabrics containing other b-type and m-type devices manufactured by Brocade. This versatile hardware can serve as a new top tier (or backbone) in a complex fabric and provide connections to other b-type and m-type directors, switches, and routers.

Here are some quick SAN768B facts:

- Drives new levels of performance with 8 Gbps Fibre Channel (FC) technology
- Reduces total cost of ownership (TCO) through consolidation of network resources

- Protects existing infrastructure investment while positioning for future technologies
- Manages your infrastructure with greater flexibility and scalability
- Unifies management framework for consolidated and virtualized resources
- Improves energy efficiency by combining higher bandwidth with reduced power consumption.

Cisco MDS

The Cisco MDS 9000 family provides a full suite of switches, directors, and routers.

Cisco MDS 9100 series Switches

In this section, we will explore the Cisco MDS 9100 series switches.

Cisco MDS 9124 Express

The Cisco MDS 9124 Express for IBM System Storage is designed to address the needs of small and midsize businesses with a wide range of SAN capabilities. It can be used as part of SAN solutions from simple single-switch configurations to larger multi-switch configurations in support of fabric connectivity and advanced business continuity capabilities. Fabric connectivity capabilities can be the basis for infrastructure simplification solutions

More on the Web

- Cisco MDS 9124 info on PartnerWorld
- Cisco MDS 9124 info on IBM.com

for IBM System i, System p, and System x servers and storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity capabilities can help businesses protect valuable data with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software.

Here are some fast Cisco MDS 9124 facts:

- Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft Windows, UNIX, Linux, NetWare, and IBM OS/400 operating systems
- High performance 1, 2, and 4 Gigabit per second links with pay-as-you-grow scalability enable growth from 8 to 16 to 24 ports
- Designed for high availability with hot-swappable, dual power supplies and non-disruptive firmware upgrades
- Cisco MDS 9000 family compatibility supports scalability and consistent service as the SAN grows
- Enterprise Package and Fabric Manager Server package provide added intelligence and value.

Cisco MDS 9134

The Cisco MDS 9134 for IBM System Storage is designed to address the needs of midsize businesses and large enterprises with a wide range of storage area network (SAN) capabilities. It can be used as part of a high performance simple SAN with single-switch or stacked switch configurations for business-class customers in support of IT simplification and business

continuity solutions. It can also be used as an edge switch for device aggregation with 10 Gbps core director configurations for large enterprise customers.

Fabric connectivity capabilities can be the basis for IT simplification solutions for IBM System i, System p, System x, and System z servers and storage consolidation and high availability server clustering with IBM System Storage disk storage arrays. Business continuity capabilities can help businesses protect valuable data with IBM System Storage tape libraries and IBM Tivoli Storage Manager data protection software. Advanced connectivity capabilities can help businesses protect against major disasters with IBM System Storage disk metro and global mirroring disaster recovery solutions.

More on the Web

- Cisco MDS 9134 info on PartnerWorld
- Cisco MDS 9134 info on IBM.com

Here are some fast Cisco MDS 9134 facts:

- Simple-to-use 4 and 10 Gigabit per second performance for simplification and business continuity solutions with Windows, UNIX, Linux, NetWare, IBM OS/400, and IBM z/OS servers
- Cost-effective "green" switch requires up to 50 percent less power per port
- Stackable design provides pay-as-you-grow scalability and flexibility with on-demand port activation features
- Designed to support high availability with redundant, hot swappable power supplies and fans and non-disruptive firmware upgrades

- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, Mainframe, and Fabric Manager Server packages provide added intelligence and value.

Cisco MDS Routers

In this section, we will explore the Cisco MDS routers.

Cisco MDS 9222i

The Cisco MDS 9222i for IBM System Storage is designed to address the needs of midsize businesses and large enterprises with a wide range of Storage Area Network (SAN) capabilities. It can be used as a cost-effective high performance SAN extension over IP router switch for midrange SMB customers in support of IT simplification and business continuity solutions. It can also provide remote site device aggregation and SAN extension connectivity to large customer data center directors. A wide range of IBM System Storage mid-range and enterprise Storage Area Network (SAN) IT simplification and business continuity solutions can be created with the Cisco MDS 9222i for IBM System Storage multiservice modular switch. IT simplification solutions for IBM Power Systems, System i, System p, System x, and System z servers include storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity capabilities can help businesses protect valuable data

More on the Web

- Cisco MDS 9222i info on PartnerWorld
- Cisco MDS 9222i info on IBM.com

with IBM System Storage tape libraries and IBM Tivoli Storage Manager data protection software. Advanced connectivity capabilities can help businesses protect against major disasters with IBM System Storage disk metro and global mirroring disaster recovery solutions.

Here are some quick MDS 9222i facts:

- Multi-service design for high-performance business continuity solutions with Windows, UNIX, Linux, NetWare, IBMOS/400, and IBMz/OS servers
- Cost-effective "green" switch design requires up to 27 percent less power per port
- Modular design provides scalability and configuration flexibility
- Excellent availability with redundant, hot swappable components and non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, Mainframe, and Fabric Manager Server packages provide added intelligence and value.

Cisco MDS 9500 series Directors

In this section, we will explore the Cisco MDS 9500 series directors.

Cisco MDS 9506

The Cisco MDS 9506 for IBM System Storage supports 1, 2, 4, 8, and 10 Gbps Fibre Channel switch connectivity and intelligent network services to help improve the security, performance, and manageability required to consolidate geographically dispersed storage devices into a large enterprise SAN.

The Cisco MDS 9506 for IBM System Storage utilizes two Supervisor-2 Modules designed for high availability and performance. The Supervisor-2 Module combines an intelligent control module and a high-performance cross-bar switch fabric in a single unit. It uses Fabric Shortest Path First (FSPF) multipath routing, which provides intelligence to load balance across a maximum of 16 equal-cost paths and to dynamically reroute traffic if a switch fails.

More on the Web

- Cisco MDS 9506 info on PartnerWorld
- Cisco MDS 9506 info on IBM.com

Here are some fast MDS 9506 facts:

- Provides Fibre Channel throughput of up to 8 Gigabits per second (Gbps) per port and up to 64 Gbps with each Port Channel Inter-Switch Link connection
- Offers scalability from 12 to 192 1, 2, 4, and 8 Gbps Fibre Channel port
- Offers 10 Gbps ISL ports for inter-data center links over metro optical networks

- Offers Gigabit Ethernet IP, GbE ports for iSCSI, or FCIP connectivity over global networks
- High-availability design with support for non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, SAN Extension over IP, Mainframe, and Storage Services Enabler and Fabric Manager Server packages provide added intelligence and value.

Cisco MDS 9509

The Cisco MDS 9509 for IBM System Storage provides 1, 2, 4, 8, and 10 Gbps Fibre Channel switch connectivity and intelligent network services to help improve the security, performance, and manageability required to consolidate geographically dispersed storage devices into a large enterprise SAN.

The Cisco MDS 9509 for IBM System Storage utilizes two Supervisor-2 modules to support high availability and performance. The Supervisor-2 Module combines an intelligent control module and a high-performance crossbar switch fabric in a single unit. It uses Fabric Shortest Path First (FSPF) multipath routing, which supports load balancing across a maximum of 16 equal-cost paths that dynamically reroute traffic if a switch fails.

More on the Web

- Cisco MDS 9509 info on PartnerWorld
- Cisco MDS 9509 info on IBM.com

Here are some Cisco MDS 9509 facts:

- Provides Fibre Channel throughput of up to 8 Gigabits per second (Gbps) per port and up to 64 Gbps with each Port Channel Inter-Switch Link connection
- Offers scalability from 12 to 336 1, 2, 4, and 8 Gbps Fibre Channel ports
- Offers 10 Gbps ISL ports for inter-data center links over metro optical networks
- Offers Gigabit Ethernet IP (GbE) ports for iSCSI or FCIP connectivity over global networks
- High-availability design with support for non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, SAN Extension over IP, Mainframe, and Storage Services Enabler and Fabric Manager Server packages provide added function and value.

Cisco MDS 9513

The Cisco MDS 9513 for IBM System Storage supports 1, 2, 4, 8, and 10 Gbps Fibre Channel switch connectivity and intelligent network services to help improve the security, performance, and manageability required to consolidate dispersed SAN islands into a large-enterprise SAN.

The Cisco MDS 9513 for IBM System Storage utilizes two Supervisor-2 modules to support high availability. The Su-

More on the Web

- Cisco MDS 9513 info on PartnerWorld
- Cisco MDS 9513 info on IBM.com

pervisor-2 Module provides industry-leading scalability, intelligent SAN services, non-disruptive software upgrades, stateful process restart, and failover and redundant operation. Dual crossbar switching fabric modules provide a total internal switching bandwidth of 2.4 terabytes per second (Tbps) for interconnection of up to 11 Fibre Channel switching modules.

Here are some quick MDS 9513 facts:

- Provides Fibre Channel throughput of up to 8 Gigabits per second (Gbps) per port and up to 64 Gbps with each Port Channel Inter-Switch Link connection
- Offers scalability from 12 to 528 1, 2, 4, and 8 Gbps Fibre Channel ports
- Offers 10 Gbps ISL ports for inter-data center links over metro optical networks
- Offers Gigabit Ethernet (GbE) IP ports for iSCSI or FCIP connectivity over global networks
- Features high-availability design with support for non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN "islands" on a single physical fabric
- Provides added function and value through Enterprise, SAN Extension over IP, Mainframe, Storage Services Enabler, and Fabric Manager Server packages.

Storage Software

Bringing together the best in infrastructure management, virtualization, and productivity software, IBM storage software utilizes the best in storage technology to answer your information on demand needs. In this section, we will examine some of the key storage software offerings.

More on the Web

- Browse all IBM Storage software on IBM.com

Tivoli Storage Manager

IBM Tivoli Storage Manager (Figure S.1) is part of a family of products that helps businesses manage and control the "information tidal wave" by delivering a single point of control and administration for storage management needs. This advanced, highly scalable product helps increase the efficiency of your IT operations and helps cut costs related to storage management by providing a wide range of data protection, recovery management, and monitoring capabilities using policy-based automation.

Tivoli Storage Manager delivers centralized, Web-based administration and intelligent data move-and-store techniques to help ease storage management. The product scales from small to very large installations, and

More on the Web

- Tivoli Storage Manager info on PartnerWorld
- Tivoli Storage Manager overview on IBM.com
- Tivoli Storage Manager v6.1 announcement letter
- Tivoli Storage Manager FastBack announcement letter

Tivoli Storage Manager—automates data backup and restore functions, supports a broad range of platforms and storage devices, and centralizes storage management operations.

Tivoli Storage Manager Extended Edition—expands on backup, restore, and archive abilities with data de-duplication and disaster recovery functionality.

IBM Tivoli Storage Manager for Mail—helps secure IBM Lotus Domino and Microsoft Exchange data, regardless of where or how it is stored.

IBM Tivoli Storage Manager for Databases—helps secure IBM Informix, Oracle, and Microsoft SQL data, no matter where or how it is stored.

IBM Tivoli Storage Manager for Microsoft SharePoint—offers granular backup and recovery of SharePoint business data and content.

IBM Tivoli Storage Manager HSM for Windows—provides hierarchical storage management with a policy-based management system for migrating Windows files economically and transparently.

IBM Tivoli Storage Manager for Advanced Copy Services—protects your mission-critical data that requires 24x7 availability by delivering snapshot backup capabilities.

IBM Tivoli Storage Manager for Copy Services—delivers high-efficiency backup and restoration of data and applications, virtually eliminating backup-related performance impacts.

IBM Tivoli Storage Manager for Enterprise Resource Planning—helps protect vital SAP R/3 system data efficiently, consistently, and reliably.

IBM Tivoli Storage Manager for Space Management—automatically moves inactive data to free online disk space for important active data.

IBM Tivoli Storage Manager for Storage Area Networks—allows SAN-connected Tivoli Storage Manager servers and client computers to make maximum use of their direct network connection to storage.

IBM Tivoli Storage Manager for System Backup and Recovery—offers a comprehensive system backup, restore, and reinstallation tool that provides bare-metal restore capabilities.

Figure S.1. IBM Tivoli Storage Manager family at a glance (with links to more detail). *(continued on next page)*

IBM Tivoli Storage Manager FastBack—provides a continuous data protection and recovery management platform for Microsoft Windows servers.

IBM Tivoli Storage Manager FastBack for Microsoft Exchange—provides the ability to quickly and easily recover granular Microsoft Exchange data objects.

IBM Tivoli Storage Manager FastBack for Bare Machine Recovery—restores entire systems, whether to comparable hardware, dissimilar hardware, or a virtual machine.

IBM Tivoli Storage Manager FastBack Center—combines the features of the IBM Tivoli Storage Manager FastBack family of products into one solution.

IBM Tivoli Continuous Data Protection for Files—provides continuous, automated backup of desktop and laptop workstations.

Figure S.1. IBM Tivoli Storage Manager family at a glance (with links to more detail). *(continued from previous page)*

supports more than 50 operating system versions and hundreds of devices. It also facilitates a multitude of connections, including Internet, wide area networks (WANs), local area networks (LANs) and storage area networks (SANs). Tivoli Storage Manager helps organizations improve business continuity, and reduce the risks of data loss, minimize complexity, better manage costs, and address strict compliance requirements.

Here are some quick Tivoli Storage Manager facts:

- Helps simplify the protection and management of your data, even as it continues to grow exponentially
- Addresses business continuity by helping to shorten backup and recovery times and helping to maximize application availability with advanced data recovery management technologies

- Employs data de-duplication and a hierarchy of storage to help increase efficiencies and conserve resources
- Helps enhance data security with innovative access and encryption features
- Helps adapt to changes within the IT infrastructure to minimize service disruptions and speed restorations and backups
- Helps control storage management costs with ease-of-use features and integration with IBM network attached storage (NAS) products.

Comprehensive Data Protection Solution Express

The new IBM Comprehensive Data Protection Solution Express includes hardware and software that midsize organizations need to enhance data protection capabilities in a Windows environment. This solution helps clients restore access to email, files, and databases within seconds, rather than the hours or days it takes to restore using traditional backup solutions.

The solution consists of Tivoli FastBack, System x3550 server and IBM DS3000 Express, DS4000 Express, and DS5000 series storage. The solution offers Microsoft Windows

More on the Web

- Comprehensive Data Protection Solution info on PartnerWorld
- Comprehensive Data Protection Solution info at the IBM SMB center
- Comprehensive Data Protection Solution info on IBM.com

Server-based customers the perfect balance of data protection and recovery. Companies relying on manual tape as their primary backup and recovery medium will have faster, more reliable recoveries. For companies with remote offices, the burden of backup and recovery is removed from the non-IT savvy staff and moved to the central data center where the expertise resides. With Fastback and IBM System Storage, downtime is greatly reduced. Tivoli Fastback is based on continuous, frequent, and scheduled policy-based backups, and when paired with IBM System Storage, data recovery is quick and easy for both remote workgroups and central office environments. And for those who need application and server level protection, Fastback makes recovery of transactions, emails, and even servers quick and simple.

Here are some quick facts about the Comprehensive Data Protection Solution Express:

- Tivoli Fastback provides you value with:
  - Patented express mount technology for instant, disk-based recovery: Tape can take hours or even days to recover lost data, which means expensive downtime and low success rates. Fastback and IBM Storage reduces recovery time to minutes and ensures recovery reliability to the transaction level.
  - Protection for both servers and applications: Fastback and IBM Storage protects Windows servers, offering bare metal restores, and application level protection for Oracle, SQL, Exchange, and SAP.

  - Easy administration: Eliminate user error and much of the time spent managing backup and restores. "Set it and forget it" policy engine.
  - Granular data protection for Exchange and SQL Server: Fast, reliable recovery of individual files, emails, database transactions, as well as entire volumes. Recover data and get back to work in minutes.
  - Regulatory compliance: Accurately retain and rapidly access data required by compliance and discovery policies.

- IBM System x server features include:
  - Dedicated server to run TSM FastBack server for high-performance that maximizes your IT investment
  - Go green and save with new design and tools for optimized power management.

- IBM System Storage features include:
  - Easy-to-use storage management software common across the DS3000 and DS4000 families. Task-driven interface makes managing storage fast and easy.
  - The ASIC based RAID 6 protection with outstanding performance.
  - Single enclosure tiered storage: Put high performance Fibre Channel or SAS and high-capacity SATA drives in the same enclosure, reducing costs by eliminating the need for multiple drive enclosures.

- Dynamic features enable flexible storage management with very fast provisioning times
- DAC store: Volume group metadata is stored on all drives in the array, which allows drives to be relocated within the storage system to improve channel utilization/protection or even migrated as a complete volume group into another storage system.

Tivoli Storage Productivity Center

IBM Tivoli Storage Productivity Center can help you manage the capacity utilization of storage systems, file systems, and databases and automate file-system capacity provisioning, perform device configuration and management of multiple devices from a single user interface, tune and proactively manage the performance of storage devices on the Storage Area Network (SAN) and manage, monitor, and control your SAN fabric.

As the need to store and retain data explodes, there becomes a critical need for businesses to find better ways to control the cost of storage. Managing storage infrastructure has grown in complexity as businesses continue to acquire new storage infrastructures or a mix of multi-vendor storage assets via acquisitions or company mergers. Businesses must be able to identify, evaluate, control, and predict the growth of data through its lifecycle in order to meet storage service levels in accordance with IT Information

More on the Web

- Tivoli Productivity Center info on PartnerWorld
- Tivoli Productivity Center info on IBM.com

Library and data retention requirements. Both requirements—managing storage infrastructure and the data that resides there—are highly labor intensive. Storage infrastructure management tools such as IBM Tivoli Storage Productivity Center can help customers reduce the complexity of managing their storage environments by centralizing, simplifying, and automating storage tasks associated with storage systems, storage networks, replication services, and capacity management.

The IBM Tivoli Storage Productivity Center suite of products includes:

- IBM Tivoli Storage ProductivityCenter Basic Edition
- IBM Tivoli Storage ProductivityCenter for Data
- IBM Tivoli Storage ProductivityCenter for Disk
- IBM Tivoli Storage ProductivityCenter for Replication
- IBM Tivoli Storage ProductivityCenter Standard Edition

Here are some quick Tivoli Storage Productivity Center facts:

- Helps centralize the management of your storage infrastructure from a single interface using role-based administration and single sign-on
- Provides a single management application with modular integrated components that are easy to install and provide common services for simple/consistent configuration and consistent operations across host, fabric, and storage systems

- Helps manage performance and connectivity from the host file system to the physical disk, including in-depth performance monitoring and analysis on SAN fabric performance.

Grid Access Manager

Grid Access Manager Software enables customers with single or multiple sites and with fixed content/reference data storage requirements to improve storage utilization and investment across sites by way of an enterprise-wide, fault-tolerant storage grid with real-time failover capabilities. Grid Access Manager Software can help protect enterprise data through automated replication, lifecycle management, and digital signature functionality.

The need to retain massive volumes of business-critical fixed-content data for long periods of time presents new data and storage management challenges for IT. Users continue to demand fast performance and higher and broader availability of enterprise data. Massive data volumes combined with long retention periods require storage administrators to deliver a cost-effective storage strategy that meets the user's needs, protects valuable data, scales on demand, simplifies data migration, and automates recovery from both planned and unplanned downtime.

More on the Web

- Grid Access Manager info on PartnerWorld
- Grid Access Manager info on IBM.com

Here are some quick Grid Access Manager facts:

- Simplified management and improved storage utilization, with excellent performance

- Data protection and improved business continuity
- Support for global access, multi-site operation.

General Parallel File System

The IBM General Parallel File System (GPFS) is a high-performance file management solution that provides fast, reliable access to a common set of file data from two computers or concurrently from hundreds of systems. GPFS integrates into your environment by bringing together mixed server and storage components to provide a common view to enterprise file data. GPFS provides online storage management, scalable access, and integrated information lifecycle tools capable of managing petabytes of data and billions of files. The proven GPFS file management infrastructure provides the foundation for optimizing the use of your computing resources.

More on the Web

- General Parallel File System info on PartnerWorld
- General Parallel File System info on IBM.com

Here are some fast GPFS facts:

- Scalable, high-performance file management for AIX and Linux systems
- Capable of supporting petabytes of storage and thousands of disks within a single file system
- Reliable platform with transparent node failover, data replication, and multi-site capabilities

- Information lifecycle toolkit simplifies the management of tiered storage, including tape
- More than 10 years of customer experience supporting some of the world's most demanding applications.

VTF Mainframe

IBM System Storage VTF Mainframe (VTFM) is an automated mainframe software product that is proven and has been accepted by Global 2000 companies across markets including financial services, automotive, and transportation, as well as the private sector including government and education. VTFM emulates IBM-compatible cartridge devices and tape volumes on z/OS platforms and transparently directs your tape data onto disk. While continuing to use tape as your apparent data storage target, VTFM enables you to leverage a cost-effective disk solution for tape data storage and retrieval.

VTFM seamlessly integrates within a physical tape environment without the need to change code or applications. VTFM is hardware agnostic—supporting all industry-standard z/OS compatible disk storage subsystems—giving customers the freedom of choice to use VTFM with their existing ESCON or FICON disk arrays. Emulating the widest range of tape devices (3480/3490/3590/3592), it is completely transparent to the host, applications, tape management systems, and users while offering advanced features such as shared tape access using VTFM Parallel Access Tape, remote data

More on the Web

- VTF Mainframe announcement letter
- VTF Mainframe info on PartnerWorld

protection using VTFM FTP-Vault, and advanced disk pool free-space management using the VTFM Destager.

Here are some quick VTF Mainframe facts:

- Supports up to 256 virtual tape drives per VTFM started task and an unlimited number of virtual tapes
- Emulates IBM 3480, 3490, 3590, and 3592 tape drives while supporting all tape commands
- Supports all industry-standard z/OS compatible tape management systems
- VTFM FTP-Vault supports z/OS mainframe FTP servers and open systems FTP servers
- VTFM Destager supports all industry-standard z/OS compatible disk space management systems.

Storage Services

In today's environment, when thinking about Information Infrastructure, one needs to think global and have a worldwide perspective. Businesses operate 24x7x365, and there is no such thing as "real-time." It's about "all the time." IBM Global Technology Services offers service products that can help with enabling clients to gain insight into how their LOBs are using storage assets and institutionalize storage best practices across the enterprise, provide the structure for a comprehensive information archiving strategy,

More on the Web

- Storage and data services info on IBM.com

and help maximize the value of information by reducing the risks to a customer's business that come as a result of poor information infrastructure management.

By proactively establishing a well-organized approach to your storage and data environment, you can gain the advantages that come from an effective storage infrastructure. You can provide business users with required access to data, giving key decision makers the information they need to help innovate and grow your revenue. You can cost-effectively deliver storage performance that meets current needs, while laying a strong foundation for the future. And you can better manage business risks and uphold regulatory compliance. IBM Global Technology Services offers services that can help you address storage and data needs from end to end, including assessment, planning, design, implementation, and management. Figure C.1 lists some storage and data services along with links to more detail.

Here are some quick Storage Services facts:

- Enables improved decision making and access to information
- Simplifies management of your storage and data environment—Typical 20 percent reduction in operations expenses
- Optimizes clients' storage and data environment to increase utilization from 10 to 30 percent up to 80 percent
- Reduce reputation risks and audit deficiencies—Data subject to regulation are growing at 64 percent per year
- Manages storage growth more effectively, while controlling costs

Global Technology Services Information Infrastructure Business Partner Guide—Covers leading services to differentiate your business partner organization across mixed vendor environments in addition to key client offers, including innovative asset-based client assessments, flash demos, self-assessment tools, ROI tools, and more,

IBM Storage Optimization and Integration Services—Helping you reduce complexity, optimize performance, and manage growth by creating a cost-effective, scalable, and resilient storage infrastructure.

IBM Information Lifecycle Management Services—Helping you enable decision making by developing and executing best practices for managing information from creation through disposal—on a cost-effective IT infrastructure.

IBM Data Mobility Services—Helping clients migrate data to more efficient storage environments without disruption, regardless of vendor hardware, operating system, or distance.

IBM Storage and Data Product Services—Helping you mitigate project risk and increase product value by providing assistance with planning and implementation of storage- and data-related hardware and software products or migration of data to new environments.

IBM Storage and Data Managed Services—Helping you leverage the expertise, scale, and pre-integrated, standard capabilities of a world-class service provider that can manage the storage environment on your behalf.

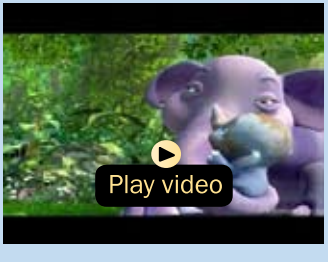


Figure C.1. IBM Global Technology Service offerings.

- Faster ROI and reduced risk—up to 50 percent faster implementation times.

STG Lab Services and Training—Storage Consulting Services

Assessing a client's IT storage environment and developing a strategy/roadmap to optimize their storage infrastructure and control costs takes specialized skills, resources, and time that most businesses do not have readily available. IBM STG Lab Services and Training's team of storage consultants and architects are ready to conduct the following "Storage Sen$e" services for your customers to assist you, our Business Partners, in your sales efforts.

Rapid Optimization Analysis (ROA)

- Provides a rapid evaluation of current storage footprint and issues, and can provide specific focus on core areas such as power/energy usage, tiering, virtualization, and data deduplication
- Conducted remotely over a one-week period, the ROA uses conference calls to kick off the engagement, gather data, and present the results
- Provides a 10–15 chart customized report with high-level recommendations, next steps, and a financial analysis showing potential cost savings versus using associated financial metrics (ROI, NPV, IRR, MIRR).

Optimization Workshop

- Focuses on storage best practices used to align the business value of information with the most appropriate and cost effective IT infrastructure
- Conducted at the client site with STG storage architects professionally facilitating a one- or two-day workshop
- Can address transactional (all types of customers) and medical imaging/fixed content (healthcare providers) environments
- Provides a 40–50 chart customized report with recommendations, next steps, and a financial analysis showing potential cost savings using associated financial metrics (ROI, NPV, IRR, MIRR).

Optimization Study

- Focuses on storage best practices used to align the business value of information with the most appropriate and cost effective IT infrastructure
- Conducted at the client site with STG storage architects meeting with key client personnel in detailed one-on-one interviews
- Can address transactional (all types of customers) and medical imaging/fixed content (healthcare providers) environments

- Provides an 80–100 chart customized report with detailed recommendations, in-depth analysis data, next steps, and a financial analysis showing potential cost savings using associated financial metrics (ROI, NPV, IRR, MIRR).

More on the Phone

- For more information, contact one of our lab services opportunity managers:

– Barbara Read (bmread@us.ibm.com, 206-290-7578)

– Jim Surmacewicz, Jr. (jrsurmac@us.ibm.com, 520-799-4519)

– Bill O'Brien (wobrien@us.ibm.com, 919-301-8049).

5

Data Center Networking

In this chapter, we explore IBM's data center networking offerings.

Data Center Networking Basics

Networking is an essential element in a dynamic infrastructure and an integral part of the strategy to reduce costs, improve services, and manage risk. Organizations must continue to focus on server and storage hardware optimization, technology enhancements, service management improvement, security, resiliency, and integration projects between IT and extended business assets. However, it is important to realize that optimizing the network (including the hardware infrastructure as well as the network management) to support these initiatives is essential to ensuring that the maximum benefit is derived.

More on the Web

- Data center networking info on PartnerWorld
- Data center networking info on IBM.com
- Data center networking announcement overview
- Data center networking sales kit

Two factors drive the increased demands on data center networks. First, as the number of intelligent devices in use increases, network traffic increases as the data from those

devices are delivered into systems that are used to drive intelligent business decisions. Secondly, a highly virtualized environment must move workloads around the network in order to share common physical hardware and increase utilization to achieve greater efficiencies. This means that the network must deliver greater and sustainable performance with greater security and resilience.

In a dynamic infrastructure, the term "networking" refers to more than just the hardware that interconnects IT and communicates with external devices. In this context, networking also includes the ability to monitor, manage, and automate network resources and tasks. Building an effective network requires the ability to leverage the capabilities offered by the hardware and to enable proper planning to ensure that the flexibility required is delivered. IBM has over 30 years of experience designing and integrating servers, storage, networks, and management solutions in the data center. IBM also has an unmatched portfolio of hardware, software, and service needed to build and manage networks capable of supporting dynamic infrastructures.

IBM delivers:

- A broad portfolio of networking services that enable cost effective, secure networking including networking for data centers, campus and LAN, remote user connectivity, and application acceleration (GTG networking strategy, optimization, and integration services)
- A full suite of network security technologies and security services consulting and managed services for network and business

resiliency (GTS Security and Privacy and Business Resiliency Services and Proventia Network Security products)

- The Tivoli Netcool management suite offers unparalleled breadth, depth, and value in heterogeneous event, fault, and network management as the foundation of consolidated operations for dynamic infrastructure management
- Comprehensive network connectivity technology offerings (Ethernet, Fibre Channel, and FCoE) with heterogeneous management through IBM Tivoli Network Manager, IBM Tivoli Storage Manager, and IBM Director.

Data Center Networking Product Quick Reference

In this section, we will explore the IBM line of Ethernet switches and routers that provide an integrated end-to-end resiliency and security framework.

j-type Ethernet Switches and Routers

Ethernet Switch j-type e-series

High-performance businesses demand high-performance networking solutions. These solutions include a new class of secure, scalable, and always-on enterprise switch that advances the economics of networking by enabling businesses to deploy innovative new technologies that increase revenue and improve productivity. The IBM Ethernet Switch J48E with Virtual Chassis technology combines the compact, pay-as-you-grow economics and low power and cooling requirements of

stackable switches with the performance, availability, operational ease, and port densities of chassis-based platforms to meet the demands of today's high-performance enterprises.

The IBM J-type Ethernet Switch J48E combines the high availability (HA) and carrier-class reliability of modular systems, and it is designed to deliver:

- 1 RU, 320 watts with power over Ethernet
- Forty-eight ports of 10/100/1000BASE-T ports
- Virtual chassis technology allowing up to 480 ports as a single logical device
- Optional 10 GbE uplink ports to j-Series core switches (4274-Exx and 4274-Mxx)
- Eight ports of Power over Ethernet
- Redundant, internal hot-swappable power supplies
- Hot-swappable fan tray with redundant blowers
- Consistent modular JUNOS control plane feature implementation
- Dual Route Engines with Graceful Routing Engine Switchover (GRES)
- Single management interface
- Scales from 48 to 480 ports with up to 20 10 GbE uplinks.

IBM Ethernet Switch J08E and IBM Ethernet Switch J16E are designed to deliver the performance, scalability, and high availability required for today's high-density data center and

More on the Web

- Ethernet Switch J-type e-series info on PartnerWorld
- Ethernet Switch J-type e-series info on IBM.com

cloud computing environments. Supporting a variety of GbE and 10 GbE line cards and featuring a built-in migration path to 100 GbE deployments, the J08E and J16E provide the highly scalable solution required by today's high-performance data centers and are positioned to support even more demanding network environments in the future.

Here are some quick facts about the J08E and J16E:

- High-performance 8-slot (J08E) and 16-slot (J16E) switches support the data center as well as campus LAN core and aggregation layer deployments
- Scalable switch fabric delivers up to 320 Gbps per slot
- 48-port 10/100/1000BASE-T and 100BASE-FX/1000BASE-X line cards support up to 384 (J08E) or 768 (J16E) GbE ports per chassis
- Carrier-class architecture includes redundant internal routing engines, switch fabrics, power, and cooling, ensuring uninterrupted forwarding and maximum availability
- Eight (J08E) and 16 (J16E) dedicated I/O slots
  - 6.2 (J08E) and 12.4 (J16E) Tbps backplane capacity
  - 320 Gbps (full duplex) per slot fabric capacity
  - Full 10 GbE line-rate forwarding (even under failure conditions)

– Dedicated data, control, and management planes.

Ethernet Router j-type m-series

IBM Ethernet Routers j-type m-series offer powerful switching and security capabilities designed to deliver the reliability and flexibility needed to accelerate new business innovations. These routers offer innovations with advanced routing features and high performance application-specific integrated circuits (ASICs).

Optimized for Ethernet, these routers are used to bring high performance, scalability, and availability for LAN aggregation and core and data center aggregation and core deployments.

All three j-type m-series routers are designed to address high performance networking requirements that benefit from advanced routing features such as network virtualization with MPLS, QoS, logical interface scalability, high availability (HA), and low-latency multicast.

IBM Ethernet Routers J02M, J06M, and J11M deliver high-port density as well as performance of up to 960 Gbps throughput, scalability, and reliability in a space-efficient package. The routers offer fully redundant hardware that includes a redundant switch control board (SCB) and routing engines (REs) plus fan trays and power supplies designed to increase system availability.

Here are more facts about these routers:

More on the Web

- Ethernet Switch j-type m-series info on PartnerWorld
- Ethernet Switch j-type m-series info on IBM.com

- J02M offers up to 120 Gigabit Ethernet or up to 12 10-Gigabit Ethernet ports
- J06M offers up to 240 Gigabit Ethernet or up to 24 10-Gigabit Ethernet ports
- J11M offers up to 480 Gigabit Ethernet or up to 48 10-Gigabit Ethernet ports
- J02M has three DPC slots—two with SCB redundancy and 40 Gbps per slot
- J06M has eight slots—two for fabric cards/REs; up to 240 Gbps (full-duplex) from six line cards
- J11M has 14 slots—two for fabric cards/REs with the option of one additional SCB for redundancy; up to 480 Gbps (full-duplex) from 12 line cards
- Throughput: J02M up to 240 Gbps; J06M up to 480 Gbps; J11M up to 960 Gbps.

IBM b-Type Converged and Ethernet Switches and Routers

Converged Switch B32

The IBM b-type Converged Switch B32 is designed to provide outstanding performance with a reliable platform that helps reduce cabling complexity, equipment acquisition costs, and operational costs associated with space, power consumption, and cooling. This multi-protocol top-of-rack switch features excellent space efficiency and low power consumption, leading the way toward a "greener" data center.

The B32 features eight 8 Gbps FC ports along with 24 CEE ports with 10 Gbps link speeds. The CEE ports are capable of transporting both FC Storage Area Network (SAN) data and Ethernet LAN traffic—eliminating the need for separate SAN and LAN adapters and cables.

More on the Web

- Converged Switch B32 info on PartnerWorld
- Converged Switch B32 info on IBM.com

Here are some quick Converged Switch B32 facts:

- Outstanding performance with eight Fibre Channel (FC) ports concurrently active at 8 Gigabits per second (Gbps) and 24 Converged Enhanced Ethernet (CEE) ports concurrently active at 10 Gbps link speeds
- High density design with 32 ports in a 1U enclosure
- "Green" energy efficiency significantly reduces power consumption while generating less heat
- Enterprise-class availability features such as hot-swappable, redundant, and integrated fan and power supply assemblies
- Streamlines management by utilizing IBM System Storage Data Centre Fabric Manager (DCFM) and extensions for FCoE and CEE.

Ethernet Switch b-type x-series

The IBM b-type Ethernet Switch B24X is a compact, high-performance, high-availability, and high-density 1 RU switch specifically designed for mission-critical data centers and HPC requirements. This switch provides 24 10/1 GbE (SFP+) ports

More on the Web

- b-type x-series info on PartnerWorld
- b-type x-series info on IBM.com

plus four 10/100/1000MbE (RJ45) ports of connectivity in an ultra-low-latency, cut-through, non-blocking architecture.

This switch is an ideal cost-effective solution for server or compute-node connectivity. It can support 1 GbE servers until they are upgraded to 10 GbE-capable network interface cards (NICs), simplifying migration to 10 GbE server farms. In addition, the switch can be positioned as a 10 GbE aggregation switch behind 1 GbE access switches.

Here are some quick Ethernet Switch b-type x-series facts:

- A 1U, high-density top-of-rack data center switch for 10 GbE server access and aggregation with 24 10 GbE/1 GbE dual-speed (SFP+) ports plus four 10/100/1000 Megabit Ethernet (MbE) (RJ45) ports
- Flexibility to mix 10 GbE and 1 GbE servers, protecting investments and streamlining migration to 10 GbE-capable server farms
- Wire-speed performance with an ultra-low-latency, cut-through, non-blocking architecture that is ideal for HPC environments
- Highly efficient power and cooling with front-to-back airflow, automatic fan speed adjustment, and use of SFP+ and direct attached SFP+copper (Twinax) for maximum flexibility

- High availability with redundant, load-sharing, hot-swappable, auto-sensing/switching power supplies and silent triple-fan assembly
- End-to-end quality of service (QoS) with hardware-based marking, queuing, and congestion management
- Embedded per-port sFlow capabilities to support scalable hardware-based traffic monitoring.

Ethernet Switch b-type r-series

IBM b-type r-series Ethernet switches are a family of compact 1 RU, multi-service edge/aggregation switches with a powerful set of capabilities that combine performance with rich functionality at the network edge. These switches offer network planners a broad set of high-performance Layer 2, IPv4 unicast and multicast capabilities in the same device, and come in six different models.

The b-type r-series switches are designed to meet the challenges of large data centers and campus environments by providing a broad set of features, including wire-speed performance, deep packet buffers (64 MB per 24-port 1 GbE or 2-port 10 GbE group), and low latency in a compact 1U form factor. To ensure a robust and scalable switching infrastructure, a wide variety of spanning tree protocols are supported including SSTP, RSTP, MSTP, and PVST/PVST+ compatibility.

More on the Web

- b-type r-series info on PartnerWorld
- b-type r-series info on IBM.com

Here are some quick Ethernet Switch b-type r-series facts:

- Compact 1 RU IP/MPLS/VRF-capable switch that is purpose-built for a large data center and advanced carrier Ethernet applications
- Wire-speed, non-blocking performance in all models
- Available 24-port and 48-port configurations in both 100/1000 MbE SFP (HybridFiber) and 10/100/1000 MbE RJ-45 configurations to suit versatile access/aggregation deployment
- Full Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge
- Available Full Layer 3 or Metro Edge upgrade enables maximum scalability or deployment into metro networks
- MEF 9 and MEF 14 certified, with comprehensive operations, administration, and maintenance (OAM) capabilities based on IEEE 802.1ag-2007 and MEF Service OAM Framework.

Ethernet Switch b-type c-series

The IBM b-type c-series Ethernet switches are a family of compact 1 RU, multi-service edge/aggregation switches with a powerful set of capabilities that combine performance with rich functionality at the network edge. These switches offer network planners a broad set of high-performance Layer 2, IPv4 unicast, and multicast capabilities in the same device.

b-type c-series Ethernet switches are designed to meet the challenges of large data centers and campus environments by providing a broad set of features, including wire-

speed performance, deep packet buffers (64 MB per 24-port 1 GbE or 2-port 10 GbE group), and low latency in a compact 1U form factor. To ensure a robust and scalable switching infrastructure, a wide variety of Spanning Tree Protocols are supported including SSTP, RSTP, MSTP, and PVST/PVST+ compatibility.

More on the Web

- b-type c-series info on PartnerWorld
- b-type c-series info on IBM.com

Here are some quick Ethernet B-type c-series facts:

- Compact 1 RU IP/MPLS/VRF-capable switch that is purpose-built for a large data center and advanced carrier Ethernet applications
- Wire-speed, non-blocking performance in all models
- Available 24-port and 48-port configurations in both 100/1000 MbE SFP (HybridFiber) and 10/100/1000 MbE RJ-45 configurations to suit versatile access/aggregation deployment
- Full Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge
- Available Full Layer 3 or Metro Edge upgrade enables maximum scalability or deployment into metro networks
- MEF 9 and MEF 14 certified, with comprehensive operations, administration, and maintenance (OAM) capabilities based on IEEE 802.1ag-2007 and MEF Service OAM Framework.

Ethernet Switch b-type g-series

IBM b-type g-series Ethernet access switches provide enterprise organizations with a flexible and feature-rich solution for building a secure and converged network edge. The switches support 48x 1 GbE RJ45 ports including 4x 1 GbE SFP combination ports. The B48G is upgradeable with two 10 GbE uplink ports to consolidate connections into the enterprise aggregation point, campus LANs, or metro area networks. The B50G comes with 2x 10 GbE CX4 stacking ports, providing the flexibility of a "pay-as-you-grow" architecture.

Both models enable a converged solution for vital network applications such as VoIP, wireless access, WebTV, video surveillance, building management systems, triple play (voice + video + data) services, and remote video kiosks in a cost-effective, high-performance, compact design. Support for the IEEE 802.1AB LLDP and ANSI TIA 1057 LLDP-MED standards enable organizations to deploy interoperable, multi-vendor solutions for unified communications. Configuring IP endpoints, such as VoIP stations, can be a complex task requiring manual and time-consuming configuration.

More on the Web

- b-type g-series info on PartnerWorld
- b-type g-series info on IBM.com

Here are some quick Ethernet switch b-type g-series facts:

- Compact 48-port 10/100/1000 Mbps access switches are field upgradeable to support Class 3 Power over Ethernet (PoE) providing 15.4 watts of power per port

- Full IPv4 Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge; supported features include: RIP v1/v2 route announcement, static IP routes, virtual and routed interfaces, DHCP relay, and VRRP
- Helps optimize network traffic with Layer 2 multicast support
- Available edge layer 3 upgrade extends routing to the network edge
- B50G model features advanced Iron Stack stacking technology over 2x 10 GbE CX4 ports, allowing up to eight systems to be stacked and managed as a single virtual chassis
- Highly available, hot-swappable, N+1 load-sharing AC power supplies
- Advanced suite of security capabilities, including ACLs, MAC filters, TCP SYN and ICMP denial of service (DoS) protection, Spanning Tree Protocol BPDU guard, root guard, unicast, broadcast and multicast rate limiting, 802.1X authentication, and enhanced lawful intercept features.

Ethernet b-type m-series Router

IBM b-type m-series Ethernet routers provide high port density with up to 64 10 GbE, 320 1 GbE, or 128 OC-12/48 ports in a single system with either 4-, 8-, 16-, or 32-slot configurations. This series of switching routers offers a rich set of high-performance IPv4, IPv6, multiprotocol label switching

(MPLS) and multi-virtual routing and forwarding (VRF) capabilities as well as advanced Layer 2 switching to address the diverse needs of environments ranging from large enterprises, data centers, government networks, education and research networks, high performance computing, and metro networks to ISPs.

Designed to enable reliable converged infrastructures and support mission-critical applications, the m-series features an advanced N+1 redundant switch fabric architecture designed for very high availability, even in the case of a switch fabric card failure. The redundant fabric architecture is complemented by comprehensive hardware redundancy for the management modules, power supplies, and cooling system.

More on the Web

- b-type m-series info on PartnerWorld
- b-type m-series info on IBM.com

Here are some quick Ethernet Router b-type m-series facts:

- Up to 10 Gb/second Ethernet routing and switching with a variety of capacities and interface options to meet the expanding needs of high-end enterprises and service providers
- Designed for low power consumption and efficient heat dissipation
- Provides wire-speed performance for IP/MPLS routing and switching combined with advanced packet processing and traffic management capabilities

- High port density and compact size yields significant savings for network operators, including savings on power, cooling, and rack space costs
- Full IPv4 and IPv6 Layer 2 and Full Layer 3 capabilities for maximum deployment performance and versatility.

Ethernet Switch b-type s-series

IBM b-type s-series Ethernet switches meet today's demanding requirements to protect, optimize, and grow the enterprise from basic connectivity to much higher levels of intelligent service-based infrastructures, providing even greater value to organizations. A highly dense, resilient, and flexible architecture allows scaling up to 384 10/100/1000 Mbps Class 3 (15.4 watts) PoE capable ports or 36 ports of high-speed 10 GbE.

Designed to extend control from the network edge to the backbone, the switches provide intelligent network services, including superior quality of service (QoS), predictable performance, advanced security, comprehensive management, and integrated resiliency. A common operating system and shared interface and power supply modules between the Ethernet Switch B08S and B16S help reduce the cost of ownership by minimizing operational expenses and improving return on investment (ROI).

More on the Web

- b-type s-series info on PartnerWorld
- b-type s-series info on IBM.com

Here are some quick Ethernet Switch b-type s-series facts:

- Optimized for total network convergence, supports industry-leading auto-detecting IEEE 802.3af class 1, 2, and (up to 15.4 watts) Power over Ethernet (PoE) interfaces
- Wire-speed, scalable, low-latency 10 Gigabit Ethernet (GbE) support along with advanced quality of service (QoS) ideal to carry the widest varieties of application traffic
- Highly available and resilient 1+1 management, fabric, and N+1 power architecture helps enable critical business continuity
- Robust PoE auto-detection enables support for PoE and non-PoE devices along with auto-configuration of VoIP endpoints to simplify device deployment
- Full Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge
- Helps optimize network traffic with Layer 2 multicast support
- Available Full Layer 3 and IPv6 options ensure maximum scalability for future network growth.

About the Editor

Jim Hoskins is the founder of Maximum Press, a premier publisher of books, ebooks, and rich media that help businesses apply technology profitably. Jim has been involved with computer technology design, implementation, and education for over 25 years. He is the author of many articles and books covering a wide range of technology and Internet business topics. Jim spent a decade with IBM designing computer systems and directly helping businesses of all sizes design and implement real-world solutions. He is the author/editor of the popular *Exploring IBM* series which has sold over 350,000 copies in 12 languages. Jim has a degree in electrical engineering from the University of Florida and resides in Gulf Breeze, Florida, with his wife and five children. You can reach Jim via email at jimh@maxpress.com.

Appendix A: DS3000 Machine Type/ Part Number Cross Reference

More on the Web

- DS3000 interoperability matrix

DS3000 Storage Controllers and Expansion Units

Description	PN/SEO ID	MTM	FC
DS3200 SAS Storage Controllers			
IBM System Storage DS3200 SAS Single Controller	172621X	1726-HC2	2603
IBM System Storage DS3200 SAS Dual Controller	172622X	1726-HC2	2604
IBM System Storage DS3200 SAS Dual Controller DC Power Model	172622T	1726-HC6	2627
IBM System Storage DS3200 SAS Single Controller Express Model	172621E	N/A	N/A
IBM System Storage DS3200 SAS Dual Controller Express Model	172622E	N/A	N/A
DS3300 iSCSI Storage Controllers			
IBM System Storage DS3300 iSCSI Single Controller	172631X	1726-HC3	2618
IBM System Storage DS3300 iSCSI Dual Controller	172632X	1726-HC3	2619
IBM System Storage DS3300 iSCSI Dual Controller DC Power Model	172632T	1726-HC7	2711
IBM System Storage DS3300 iSCSI Single Controller Express Model	172631E	N/A	N/A
IBM System Storage DS3300 iSCSI Dual Controller Express Model	172632E	N/A	N/A

DS3400 FC Storage Controllers

Description	PN/SEO ID	MTM	FC
IBM System Storage DS3400 FC Single Controller	172641X	1726-HC4	2605
IBM System Storage DS3400 FC Dual Controller	172642X	1726-HC4	2606
IBM System Storage DS3400 FC Dual Controller DC Power Model	172642T	1726-HC8	2626
IBM System Storage DS3400 FC Single Controller Express Model	172641E	N/A	N/A
IBM System Storage DS3400 FC Dual Controller Express Model	172642E	N/A	N/A
IBM System Storage DS3400 FC Single Controller Simple SAN Express Kit	172641U	N/A	N/A
IBM System Storage DS3400 FC Dual Controller Simple SAN Express Kit	172642U	N/A	N/A
IBM System Storage DS3400 FC Single Controller Simple SAN Express Kit	172641S	N/A	N/A
IBM System Storage DS3400 FC Dual Controller Simple SAN Express Kit	172642S	N/A	N/A

DS3950	Machine Type	Model	Part Number
DS3950 Express Model 94 (2 GB Cache, 1 GB per controller), Four 8 Gbps FC host ports	1814	94A	181494H
DS3950 Express Model 98 (4 GB Cache, 2 GB per controller) Four 8 Gbps FC host ports, Four 1 Gbps iSCSI host ports)	1814	98A	181498H
EXP395 Express Expansion Unit (16 drive bays)	1814	92A	181492H

EXP3000 Expansion Units	PN/SEO ID	MTM	FC
IBM System Storage EXP3000 (Single Environmental Service Module)	172701X	1727-HC1	2676
IBM System Storage EXP3000 DC Power Model (Dual ESMs included)	172702T	1727-HC5	2628
IBM System Storage EXP3000 Express Model (for DS3000 attachment)	172701E	N/A	N/A
IBM System Storage EXP3000 Express Model (for MegaRAID attach)	172701M	N/A	N/A

DS3000 Hardware Options

Description	PN	MTM	FC
Hardware Options			
DS3000 1 GB Cache Memory Upgrade	39R6517	1726	4838
DS3000 System Memory Cache Battery Replacement	39R6519	1726	4839
DS3200 SAS 2-Port Daughter Card	39R6509	1726	4836
DS3200 SAS Controller Upgrade	39R6507	N/A	N/A
DS3300 iSCSI Controller Upgrade	39R6511	N/A	N/A
DS3400 FC Controller Upgrade	39R6513	N/A	N/A
EXP3000 Environmental Services Module	39R6515	1727	4802
Cable and Connector Options			
IBM 1m SAS Cable	39R6529	1726	3708
IBM 3m SAS Cable	39R6531	1726	3707
4 Gbps SW SFP Transceiver	39R6475	1726	4804
1M LC-LC Fibre Channel Cable	39M5696	1726	3703
5M LC-LC Fibre Channel Cable	39M5697	1726	3704
25M LC-LC Fibre Channel Cable	39M5698	1726	3705

DS3000 Software Options

Description	PN	MTM	FC
DS3200 Software Feature Pack	39R6540	1726	4840
DS3300 Software Feature Pack	42C2142	1726	4856
DS3400 Software Feature Pack	42C2143	1726	4857
DS3000 EXP3000 Expansion License	39R6537	1726	4846
DS3000 4 to 8 Partition Expansion License	44W2138	1726	5068
DS3000 4 to 16 Partition Expansion License	39R6536	1726	4841
DS3000 4 to 32 Partition Expansion License	44W2140	1726	5069
DS3000 8 to 16 Partition Expansion License	44W2142	1726	5070
DS3000 8 to 32 Partition Expansion License	44W2144	1726	5071
DS3000 16 to 32 Partition Expansion License	44W2152	1726	5072
DS3000 FlashCopy Expansion License	39R6533	1726	4842
DS3000 VolumeCopy License	39R6534	1726	4843
DS3000 FlashCopy and VolumeCopy License	39R6535	1726	4844
DS3000 FlashCopy Plus Expansion License	44W2149	1726	5091
DS3000 AIX/VIOS Host Attach License	13N1923	1726	4923
DS3000 Linux on Power Host Attach License	44W2101	1726	4924
DS3000 Solaris Host Attach License	44W2136	1726	5073

Appendix B: DS4000 Machine Type/ Part Number Cross Reference

DS4400

Model Type/ Feature	Part Number	Description
2104	24P0960	DS4000 FC2-133 HOST BUS ADAPTER (for xSeries)
2210	19K1271	SHORT WAVE SFP GBBIC
2220	19K1272	LONG WAVE SFP GBIC
5601	19K1247	1M LC-LC FIBRE OPTIC CABLE
5605	19K1248	5M LC-LC FIBRE OPTIC CABLE
5625	19K1249	25M LC-LC FIBRE OPTIC CABLE
5702	19K1250	LC-SC FIBRE CHANNEL ADAPTER

DS4500

Model Type/ Feature	Part Number	Description
2104	24P0960	DS4000 FC2-133 HOST BUS ADAPTER (for xSeries)
2210	19K1271	SHORT WAVE SFP GBIC
2220	19K1272	LONG WAVE SFP GBIC
3507	19K1269	DS4000 2GBPS MINI HUB
5601	19K1247	1M LC-LC FIBRE OPTIC CABLE
5605	19K1248	5M LC-LC FIBRE OPTIC CABLE
5625	19K1249	25M LC-LC FIBRE OPTIC CABLE
5702	19K1250	LC-SC FIBRE CHANNEL ADAPTER

DS4700

Model Type/ Feature	Part Number	Description
1814-70A	N/A	IBM DS4700 Express Model 70 (2 GB cache, 1 GB per Cntrler.)
1814-72A	N/A	IBM DS4700 Express Model 72 (4 GB cache, 2 GB per Cntrler.)
N/A	181470H	IBM DS4700 Express Model 70 (2 GB cache, 1 GB per Controller) + Windows Host Kit and 2 Storage Partitions
N/A	181472H	IBM DS4700 Express Model 72 (4 GB cache, 2 GB per Controller) + Windows Host Kit and 8 Storage Partitions
1814-70S	N/A	IBM DS4700 Express Model 70-DC Power (2 GB cache, 1 GB per Controller)
1814-72S	N/A	IBM DS4700 Express Model 72-DC Power (4 GB cache, 2 GB per Controller)
N/A	181470T	IBM DS4700 Express Model 70-DC Power (2 GB cache, 1 GB per Controller) + Windows Host Kit and 2 Storage Partitions
N/A	181472T	IBM DS4700 Express Model 72-DC Power (4 GB cache, 2 GB per Controller) + Windows Host Kit and 8 Storage Partitions
2010	42D3306	DS4700 Telco Bezel option
2012	42D3329	DS4700/EXP810 DC Power Cords
2105	39M5894	DS4000 1-pt PCI-X 4 Gbps HBA
2106	39M5895	DS4000 2-pt PCI-X 4 Gbps HBA
2410	26K7941	SW 4 Gbps SFP transcvr pair
4610	39M4554	500 GB/7.2K SATA E-DDM
4615	43W9714	750 GB/7.2K SATA II E-DDM
4618	44X2458	1000 GB/7.2 K SATA II E-DDM
5413	40K6816	4 Gbps FC, 73.4 GB/15K E-DDM
5414	40K6820	4 Gbps FC, 146.8 GB/15K E-DDM
5415	42D0410	4 Gbps FC, 300 GB/15K E-DDM
5601	39M5696	1M Fiber Optic Cable LC-LC
5605	39M5697	5M Fiber Optic Cable LC-LC
5625	39M5698	25m Fiber Optic Cable LC-LC

DS4700

Model Type/ Feature	Part Number	Description
7301	41Y5203	DS4700 FlashCopy
7303	41Y5208	DS4700 VolumeCopy
7304	41Y5212	DS4700 Flash/VolumeCopy
7305	41Y5214	DS4700 Enhanced Remote Mirror
7306	41Y5217	DS4700 FC/SATA Encluding Intemix
7382	41Y5222	DS4700 Model 70 EXPs. Att 1-3
7383	41Y5225	DS4700 Model 70 EXPs. Att 4-6
7384	41Y0704	DS4700 Model 72 EXPs. Att 4-6
7700	N/A	DS4700 Windows Host Kit
7701	41Y5178	DS4700 Linux/Intel Host Kit
7702	41Y5180	DS4700 Novell Netware Host
7703	41Y5182	DS4700 VMware ESX Host Kit
7711	41Y5184	DS4700 AIX Host Kit
7712	41Y5186	DS4700 SUN Solaris Host Kit
7713	41Y5188	DS4700 HPUX Host Kit
7714	41Y5190	DS4700 Linux for Power Host
8850	N/A	DS4700 Model 70 2-Storage IPO
8851	N/A	DS4700 Model 70 4-Storage IPO
8852	N/A	DS4700 Model 70 8-Storage IPO
8853	N/A	DS4700 Model 70 16-Storage IPO
8854	N/A	DS4700 Model 70 64-Storage IPO
8856	N/A	DS4700 Model 72 8-Storage IPO
8857	N/A	DS4700 Model 72 16-Storage IPO
8858	N/A	DS4700 Model 72 64-Storage IPO
8860	41Y5228	DS4700 2-4 Storage Partition MES
8861	41Y0652	DS4700 2-8 Storage Partition MES
8862	41Y0656	DS4700 4-8 Storage Partition MES
8863	41Y0660	DS4700 4-16 Storage Partition MES
8864	41Y0664	DS4700 8-16 Storage Partition MES
8865	41Y0668	DS4700 8-64 Storage Partition MES
8866	41Y0672	DS4700 16-64 Storage Partition MES
7313	44X2430	DS4700 FlashCpy 4-8 FC Upgr
7316	44E5447	DS4700 EnRMir 32-64 Mr Upgr
8831	N/A	DS4700 Mod 72 32-Stg. IPO
8832	N/A	DS4700 Mod 72 128-Stg. IPO
8841	44E5451	DS4700 32-128 Stg Par. MES
8842	44E5452	DS4700 64-128 Stg Par. MES
8855	N/A	DS4700 Mod 70 32-Stg. IPO
8859	N/A	DS4700 Mod 70 128-Stg. IPO
8867	44E5448	DS4700 8-32 Stg Part. MES
8868	44E5449	DS4700 16-32 Stg Part. MES
8869	44E5450	DS4700 32-64 Stg Part. MES

DS4800

Model Type/ Feature	Part Number	Description
1815-80A	N/A	IBM DS4800 Model 80 Disk System (4 GB cache, 2 GB per controller)
N/A	181580H	IBM DS4800 Model 80 Disk System (4 GB cache, 2 GB per controller) + Windows Host Kit and 8 Storage Partitions
1815-82A	N/A	DS4800 Model 82 3 Yr warranty
N/A	181582H	DS4800 Model 82 3 Yr warranty (8 Prtns, Windows Host Kit)
1815-84A	N/A	DS4800 Model 84 3 Yr warranty
N/A	181584H	DS4800 Model 84 3 Yr warranty (8 Prtns, Windows Host Kit)
1815-88A	N/A	DS4800 Model 88 3 Yr warranty
N/A	181588H	DS4800 Model 88 3 Yr warranty (8 Prtns,Windows Host Kit)
2024	22R4239	Model 82 Cache Upgrade to 8 GB
2025	39M5884	Model 82 Cache Upgrade to 16 GB
2028	39M5885	Model 84 Cache Upgrade to 16 GB
2104	24P0960	DS4000 FC2-133 HOST BUS ADAPTER (for xSeries)
2105	39M5894	DS4000 1-pt PCI-X 4 Gbps HBA
2106	39M5895	DS4000 2-pt PCI-X 4 Gbps HBA
2410	22R4242	4 GB SW SFP pairs
5601	19K1247	1M LC-LC Fiber Optic Cable
5605	19K1248	5M LC-LC Fiber Optic Cable
5625	19K1249	25M LC-LC Fiber Optic Cable
7301	22R4244	DS4800 FlashCopy Activation
7303	22R4245	DS4800 VolumeCopy Activation
7304	22R4246	DS4800 FlashCopy/VolumeCopy Activation
7305	22R4247	DS4800 Enhanced Remote Mirror Activation
7306	22R4248	DS4800 FC/SATA Enclosure Intermix Activation
7307	22R6621	DS4800 Model 80 Enhanced Remote Mirror
7386	23R1987	DS4800 Model 80 EXPs Att 8-14
7700	N/A	DS4800 - Windows Host Kit
7701	22R4252	DS4800 - Linux/Intel Host Kit (RedHat ES, SUSE ELS)
7702	22R4253	DS4800 - Novell Netware Host Kit
7703	22R4254	DS4800 - VMware ESX Host Kit
7711	22R4255	DS4800 - AIX Host Kit
7712	22R4256	DS4800 - SUN Solaris Host Kit
7713	22R4257	DS4800 - HPUX Host Kit
7714	22R4258	DS4800 - Linux on Power Host Kit
8102	39M5715	DS4300 IBD FOR EXCHANGE
8870	N/A	8 Storage Partitions
8871	N/A	16 Storage Partitions
8872	N/A	64 Storage Partitions
8880	22R4670	UPGRADE 8-16 Storage Partitions
8881	22R4671	UPGRADE 8-64 Storage Partitions
8882	22R4259	UPGRADE 16-64 Storage Partitions
7343	44X2931	DS4800 FlashCopy 4-16 FC Upgrade

DS4800

Model Type/ Feature	Part Number	Description
7346	44E5380	DS4800 E.RMr 64-128 Mr Upgrade
7349	44E5459	DS4800 Model 80 Enhanced Performance
8873	N/A	DS4800 32-Stg Partit-IPO
8874	N/A	DS4800 128-Stg Partit-IPO
8875	N/A	DS4800 256-Stg Partit-IPO
8876	N/A	DS4800 512-Stg Partit-IPO
8883	44E5460	DS4800 8-32 Stg Part-MES
8884	44E5461	DS4800 16-32 Stg Part-MES
8885	44E5462	DS4800 32-64 Stg Part-MES
8886	44E5463	DS4800 32-128 Stg Part-MES
8887	44E5464	DS4800 64-128 Stg Part-MES
8888	44E5465	DS4800 64-256 Stg Part-MES
8889	44E5466	DS4800 128-256 Stg Par-MES
8890	44E5467	DS4800 128-512 Stg Par-MES
8891	44E5468	DS4800 256-512 Stg Par-MES

DSExp

Model Type/ Feature	Part Number	Description
1812-81A	181281H	DS4000 EXP810
1812-81S	181281T	IBM System Storage EXP810 Expansion Unit
2010	42D3305	EXP810 Telco Bezel option
2012	42D3329	DS4700/EXP810 DC Power Cords
2410	26K7941	SHORT WAVE 4 GBPS SFP PAIR (2-PACK) LONG WAVE SFP GBIC
4610	39M4554	500 GB/7.2K SATA E-DDM
4615	43W9714	750 GB/7.2K SATA II E-DDM
4618	44X2458	1000 GB/7.2 K SATA II E-DDM
5413	40K6816	4 Gbps FC, 73.4 GB/15K E-DDM
5414	40K6820	4 Gbps FC, 146.8 GB/15K E-DDM
5415	42D0410	4 GBPS FC, 300 GB/15K E-DDM
5433	N/A	16-Pak 4 Gbps 73.4 GB/15K FC E-DDM
5434	N/A	16-Pak 4 Gbps 146.8 GB/15K FC E-DDM
5435	N/A	16-Pac 4 Gbps 300 GB/15K E-DDM
5601	39M5696	1M LC/LC 50U Fiber Optic Cable
5605	39M5697	5M LC/LC 50U Fiber Optic Cable
5625	39M5698	25M LC/LC 50U Fiber Optic Cable

DSExp

Model Type/ Feature	Part Number	Description
18147VA	18147VH	DS4200 Express Model 7V (2 GB Cache, 1 GB per controller)
4612	42D0389	DS4200 500 GB SATA EV-DDM
4617	43W9738	DS4200 750 GB SATA EV-DDM
4619	44X2454	DS4200 500 GB SATA EV-DDM
7321	41Y0743	DS4200 FlashCopy
7323	41Y0746	DS4200 VolumeCopy
7324	41Y0738	DS4200 Flash/VolumeCopy
7325	41Y0739	DS4200 Enh. Remote Mirror
7380	39M5954	DS4200 EXP420 Attach 1-3
7381	39M5957	DS4200 EXP420 Attach 4-6
7601	39M6009	DS4200 Linux/Intel Host Kit
7602	39M6041	DS4200 Novell Netware Host
7603	39M6046	DS4200 VMware ESX Host Kit
7611	39M6048	DS4200 AIX Host Kit
7612	41Y5163	DS4200 SUN Host Kit
7613	41Y0686	DS4200 HPUX Host Kit
7614	42D3252	DS4200 Linux on Power Host
8760	42D3254	DS4200 2-4 Stg. Part.- Fld
8761	42D3257	DS4200 2-8 Stg. Part.- Fld
8762	42D3260	DS4200 4-8 Stg. Part.- Fld
8763	42D3263	DS4200 4-16 Stg. Part.- Fld
8764	42D3266	DS4200 8-16 Stg. Part.- Fld
8765	42D3269	DS4200 8-64 Stg. Part.- Fld
8766	42D3272	DS4200 16-64 Stg. Part.- Fld
7333	44X2429	DS4200 FlashCpy 4-8 FC Upgrade
7336	44E5435	DS4200 EnRMir 32-64 Mr Upgrade
8755	N/A	DS4200 32-Stg Partit-IPO
8756	N/A	DS4200 128-Stg Partit-IPO
8767	44E5436	DS4200 8-32 Stg Part. MES
8768	44E5437	DS4200 16-32 Stg Part. MES
8769	44E5438	DS4200 32-64 Stg Part. MES
8770	44E5439	DS4200 32-128 Stg Par. MES
8771	44E5440	DS4200 64-128 Stg Par. MES
7600	N/A	DS4200 Windows Host Kit
8750	N/A	DS4200 - 2 Storage Partitions - Plant
8751	N/A	DS4200 - 4 Storage Partitions - Plant
8752	N/A	DS4200 - 8 Storage Partitions - Plant
8753	N/A	DS4200 - 16 Storage Partitions - Plant
8754	N/A	DS4200 - 64 Storage Partitions - Plant

Appendix C: DS5000 Part Number vs. Machine Type/Model Cross Reference

DS4700

Model Type/ Feature	Part Number	Description
1814-70A	N/A	IBM DS4700 Express Model 70 (2 GB cache, 1 GB per Cntrler.)
1814-72A	N/A	IBM DS4700 Express Model 72 (4 GB cache, 2 GB per Cntrler.)
N/A	181470H	IBM DS4700 Express Model 70 (2 GB cache, 1 GB per Cntrler.)+ Windows Host Kit and 2 Storage Partitions
N/A	181472H	IBM DS4700 Express Model 72 (4 GB cache, 2 GB per Cntrler.)+ Windows Host Kit and 8 Storage Partitions
1814-70S	N/A	IBM DS4700 Express Model 70 - DC Power (2 GB cache, 1 GB per Cntrler.)
1814-72S	N/A	IBM DS4700 Express Model 72 - DC Power (4 GB cache, 2 GB per Cntrler.)
2010		42D3306 DS4700 Telco Bezel option
2012		42D3329 DS4700/EXP810 DC Pwr Cords
2105		39M5894 DS4000 1-pt PCI-X 4 Gbps HBA
2106		39M5895 DS4000 2-pt PCI-X 4 Gbps HBA
2410		26K7941 SW 4 Gbps SFP transcvr pair
4610		39M4554 500 GB/7.2K SATA E-DDM
4615	43W9714	750 GB/7.2K SATA II E-DDM
4618	44X2458	1000 GB/7.2K SATA II E-DDM
5413	40K6816	4 Gbps FC, 73.4 GB/15K E-DDM
5414	40K6820	4 Gbps FC, 146.8 GB/15K E-DDM
5415	42D0410	4 GBPS FC, 300 GB/15K E-DDM
5416	44X2450	4 GBPS FC, 450 GB/15K E-DDM
5436		16-Pak 450 GB/15K DDM
5601	39M5696	1M FIBER OPTIC CABLE LC-LC
5605	39M5697	5M FIBER OPTIC CABLE LC-LC
5625	39M5698	25m Fiber Optic Cable LC-LC
7301	41Y5203	DS4700 FlashCopy
7303		41Y5208 DS4700 VolumeCopy
7304		41Y5212 DS4700 Flash/VolumeCopy

DS4700

Model Type/ Feature	Part Number	Description
7305	41Y5214	DS4700 Enhanced Remote Mirror
7306	41Y5217	DS4700 FC/SATA Encl. Intermix
7382	41Y5222	DS4700 Mod 70 EXPs. Att 1-3
7383	41Y5225	DS4700 Mod 70 EXPs. Att 4-6
7384	41Y0704	DS4700 Mod 72 EXPs. Att 4-6
7700	N/A	DS4700 Windows Host Kit; included in the base model 181470H and 181472H
7701	41Y5178	DS4700 Linux/Intel Host Kit
7702	41Y5180	DS4700 Novell Netware Host
7703	41Y5182	DS4700 VMware ESX Host Kit
7711	41Y5184	DS4700 AIX Host Kit
7712	41Y5186	DS4700 SUN Solaris Host Kit
7713	41Y5188	DS4700 HPUX Host Kit
7714	41Y5190	DS4700 Linux for Power Host
8850	N/A	DS4700 Mod 70 2-Stg. IPO
8851	N/A	DS4700 Mod 70 4-Stg. IPO
8852	N/A	DS4700 Mod 70 8-Stg. IPO
8853	N/A	DS4700 Mod 70 16-Stg. IPO
8854	N/A	DS4700 Mod 70 64-Stg. IPO
8856	N/A	DS4700 Mod 72 8-Stg. IPO
8857	N/A	DS4700 Mod 72 16-Stg. IPO
8858	N/A	DS4700 Mod 72 64-Stg. IPO
8860	41Y5228	DS4700 2-4 Stg. Part. MES
8861	41Y0652	DS4700 2-8 Stg. Part. MES
8862	41Y0656	DS4700 4-8 Stg. Part. MES
8863	41Y0660	DS4700 4-16 Stg. Part. MES
8864	41Y0664	DS4700 8-16 Stg. Part. MES
8865	41Y0668	DS4700 8-64 Stg. Part. MES
8866	41Y0672	DS4700 16-64 Stg. Part. MES
7313	44X2430	DS4700 FlashCopy 4-8 FC Upgrade
7316	44E5447	DS4700 EnRMir 32-64 Mr Upgrade
8831	N/A	DS4700 Mod 72 32-Stg. IPO
8832	N/A	DS4700 Mod 72 128-Stg. IPO
8841	44E5451	DS4700 32-128 Stg Part. MES
8842	44E5452	DS4700 64-128 Stg Part. MES
8855	N/A	DS4700 Mod 70 32-Stg. IPO
8859	N/A	DS4700 Mod 70 128-Stg. IPO
8867	44E5448	DS4700 8-32 Stg Part. MES
8868	44E5449	DS4700 16-32 Stg Part. MES
8869	44E5450	DS4700 32-64 Stg Part. MES

DS4800

Model Type/ Feature	Part Number	Description
1815-80A	N/A	IBM DS4800 Model 80 Disk System (4 GB cache, 2 GB per controller)
N/A	181580H	IBM DS4800 Model 80 Disk System (4 GB cache, 2 GB per controller) + Windows Host Kit and 8 Storage Partitions
1815-82A	N/A	DS4800 Model 82 3 Yr warranty
n/a	181582H	DS4800 Model 82 3 Yr warranty (8 Prtns, Wndws Host Kit)
2024	22R4239	Mod 82 Cache Upgrade to 8 GB
2025	39M5884	Mod 82 Cache Upgrade to 16 GB
2028	39M5885	Mod 84 Cache Upgrade to 16 GB
2104	24P0960	DS4000 FC2-133 HOST BUS ADAPTER (for xSeries)
2105	39M5894	DS4000 1-pt PCI-X 4 Gbps HBA
2106	39M5895	DS4000 2-pt PCI-X 4 Gbps HBA
2410	22R4242	4GB SW SFP pairs
5601	19K1247	1M LC-LC FIBRE OPTIC CABLE
5605	19K1248	5M LC-LC FIBRE OPTIC CABLE
5625	19K1249	25M LC-LC FIBRE OPTIC CABLE
7301	22R4244	DS4800 FlashCopy Activation
7303	22R4245	DS4800 VolumeCopy Activation
7304	22R4246	DS4800 FlashCopy/VolumeCopy Activation
7305	22R4247	DS4800 Enhanced Remote Mirror Activation
7306	22R4248	DS4800 FC/SATA Enclosure Intermix Activation
7307	22R6621	DS4800 Mod 80 Enhanced Remote Mirror
7386	23R1987	DS4800 Mod 80 EXPs Att 8-14
7700	N/A	DS4800 - Windows Host Kit; Included in the base model 181582H, 181584H, 181588H
7701	22R4252	DS4800 - Linux/Intel Host Kit (RedHat ES, SUSE ELS)
7702	22R4253	DS4800 - Novell Netware Host Kit
7703	22R4254	DS4800 - VMware ESX Host Kit
7711	22R4255	DS4800 - AIX Host Kit
7712	22R4256	DS4800 - SUN Solaris Host Kit
7713	22R4257	DS4800 - HPUX Host Kit
7714	22R4258	DS4800 - Linux on Power Host Kit
8102	39M5715	DS4300 IBD FOR EXCHANGE
8870	N/A	8 Storage Partitions; Included in the base model 181582H & 181584H
8871	N/A	16 Storage Partitions
8872	N/A	64 Storage Partitions
8880	22R4670	UPG 8-16 Storage Partitions
8881	22R4671	UPG 8-64 Storage Partitions
8882	22R4259	UPG 16-64 Storage Partitions
7343	44X2931	DS4800 FlashCopy 4-16 FC Upgrade

DS4800

Model Type/ Feature	Part Number	Description
7346	44E5380	DS4800 E.RMr 64-128 Mr Upgrade
7349	44E5459	DS4800 Mod80 Enhanced Performance
8873	N/A	DS4800 32-Stg Part-IPO
8874	N/A	DS4800 128-Stg Part-IPO
8875	N/A	DS4800 256-Stg Part-IPO
8876	N/A	DS4800 512-Stg Part-IPO
8883	44E5460	DS4800 8-32 Stg Part-MES
8884	44E5461	DS4800 16-32 Stg Part-MES
8885	44E5462	DS4800 32-64 Stg Part-MES
8886	44E5463	DS4800 32-128 Stg Part-MES
8887	44E5464	DS4800 64-128 Stg Part-MES
8888	44E5465	DS4800 64-256 Stg Part-MES
8889	44E5466	DS4800 128-256 Stg Part-MES
8890	44E5467	DS4800 128-512 Stg Part-MES
8891	44E5468	DS4800 256-512 Stg Part-MES

DSEXP

Model Type/ Feature	Part Number	Description
1812-81A	181281H	DS4000 EXP810
1812-81S	181281T	IBM System Storage EXP810 Expansion Unit
1812-81H		
2010	42D3305	EXP810 Telco Bezel option
2012	42D3329	DS4700/EXP810 DC Pwr Cords
		LONG WAVE SFP GBIC
2410	26K7941	SHORT WAVE 4 GBPS SFP PAIR (2-PACK)
4610	39M4554	500 GB/7.2K SATA E-DDM
4615	43W9714	750 GB/7.2K SATA II E-DDM
4618	44X2458	1000 GB/7.2K SATA II E-DDM
5413	40K6816	4 Gbps FC,73.4 GB/15K E-DDM
5414	40K6820	4 Gbps FC,146.8 GB/15K E-DDM
5415	42D0410	4 GBPS FC, 300 GB/15K E-DDM
5416	44X2450	4 GBPS FC, 450 GB/15K E-DDM
5436		16-Pak 450 GB/15K DDM
5433	N/A	16-Pak 4 Gbps 73.4 GB/15K FC E-DDM
5434	N/A	16-Pak 4 Gbps 146.8 GB/15K FC E-DDM
5435	N/A	16-PaK 4 GBPS 300 GB/15K E-DDM
5601	39M5696	1M LC/LC 50U FIBER OPTIC CABLE
5605	39M5697	5M LC/LC 50U FIBER OPTIC CABLE
5625	39M5698	25M LC/LC 50U FIBER OPTIC CABLE

DS5000

Model Type/ Feature	Part Number	Description
1818-51A		DS5100
1818-53A		DS5300
1818-D1A		EXP5000
2030		2030 8 GB Cache Memory - (4 GB per controller/1 GB DIMM)
2031		2031 16 GB Cache Memory - (8 GB per controller/1 GB DIMM)
2040		2040 Cache Upgrade 8 GB to 16 GB
2050		2050 Two Quad 4 Gbps FC Host Port Cards
2412		Short Wave 4 Gbps SFP Transceiver Pair
5601		1M LC-LC FIBER OPTIC CABLE
5605		5M LC-LC FIBER OPTIC CABLE
5625		25M LC-LC FIBER OPTIC CABLE
7350		DS5000 FLASH and VOLUME COPY
7353		DS5000 Enhanced Remote Mirror Activation
7356		DS5000 Enhanced Remote Mirror 64-128 Mirror Upgrade

7370	7370 - DS5100 Performance Upgrade (Emerald)
7510	7510 DS5000 Attach EXP810 Activation (Emerald)
7720	7720 DS5000 WINDOWS HOST KIT
7721	7721 DS5000 LINUX/INTEL HOST KI
7723	7723 DS5000 VMWARE ESX HOST KIT
7731	7731 DS5000 AIX/VIOS HOST KIT
7733	7733 DS5000 HP-UX HOST KIT
7734	7734 DS5000 LINUX ON POWER HOST
8900	8900 DS5000 8 STG PARTITION-IP0
8901	8901 DS5000 16 STG PARTITION-IP0
8902	8902 DS5000 32 STG PARTITION-IP0
8903	8903 DS5000 64 STG PARTITION-IP0
8904	8904 DS5000 128 STG PARTITION-IP0
8905	8905 DS5000 256 STG PARTITION-IP0
8906	DS5000 512 STG PARTITION-IP0
4710	750 GB/7.2K SATA DDM
4711	1000 GB/7.2K SATA DDM
5510	4 Gbps FC, 146.8 GB/15K DDM
5511	4 Gbps FC, 300 GB/15K DDM
5512	4 Gbps FC, 450 GB/15K DDM
5530	16-Pak 146.8 GB/15K DDM
5531	16-Pak 300 GB/15K DDM
5532	16-Pak 450 GB/15K DDM
5555	Bulk Ordering Feature Ind.
8930	8-16 Stg Part. MES
8931	8-32 Stg Part. MES
8932	16-32 Stg Part. MES
8933	16-64 Stg Part. MES
8934	32-64 Stg Part. MES
8935	32-128 Stg Part. MES
8936	64-128 Stg Part. MES
8937	64-256 Stg Part. MES
8938	128-256 Stg Part. MES
8939	128-512 Stg Part. MES
8940	256-512 Stg Part. MES
2052	Two Quad Host Port Cards 8 Gbps FC
7358	DS5000 Disk Encryption Activation
5520	Encryption Capable 4 GBPS FC, 146.8 GB/15K
5521	Encryption Capable 4 GBPS FC, 300 GB/15K
5522	Encryption Capable 4 GBPS FC, 450 GB/15K
5540	16PK Encryption Capable 4 GBPS FC, 146.8 GB/15K (IPO Only)
5541	16PK Encryption Capable 4 GBPS FC, 300 GB/15K
5542	16PK Encryption Capable 4 GBPS FC, 450 GB/15K

Appendix D: Part Number vs. Machine/ Type/Model Cross Reference

P/N	MACH	MOD	Description
23R1735	3580/3573	5610	10.0m VHDCI/HD68 SCSI Cable
23R6981	3580/3573	9841	2.8m Power Cord 250V Taiwan
23R6982	3580/3573	9842	2.8m Power Cord 125V Japan
23R6983	3580/3573	9843	2.8m Power Cord 250V Japan
23R6984	3580/3573	9844	2.8m Power Cord 250V Korea
23R6985	3580/3573	9845	2.8m Power Cord 250V India
23R6986	3580/3573	9846	2.8m Power Cord 125V Brazil
23R6987	3580/3573	9847	2.8m Power Cord 250V Brazil
23R6998	3573	7002	3573 Rack Mount Kit
23R6999	3573	8106	3753 Right Side Magazine
23R7000	3573	9848	Rack to PDU Line Cord
23R7007	N/A	N/A	Storage Bid Machine
23R7008	3580/3573	8002	Ultrium Cleaning Cartridge
23R7134	3580/3573	5604	4.5m VHDCI/HD68 SCSI Cable
23R7137	3573	6013	13.0m LC/LC Fibre Cable
23R7138	3573	6025	25.0m LC/LC Fibre Cable
23R7140	3573	5096	LC-SC Fibre Cable Interposer
23R7141	3580/3573	9800	2.8m Power Cord 125V U.S./CAN
23R7143	3580/3573	9986	1.8m Power Cord 125V U.S./CAN
23R7145	3580/3573	9833	2.8m Power Cord 250V U.S./CAN
23R7146	3580/3573	9820	2.8m Power Cord 250V France
23R7147	3580/3573	9821	2.8m Power Cord 250V Denmark
23R7148	3580/3573	9825	2.8m Power Cord 250V UK
23R7149	3580/3573	9827	2.8m Power Cord 250V Israel
23R7150	3580/3573	9828	2.8m Power Cord 250V Switzerland
23R7151	3580/3573	9829	2.8m Power Cord 250V South Africa

P/N	MACH	MOD	Description
23R7152	3580/3573	9830	2.8m Power Cord 250V Italy
23R7153	3580/3573	9831	2.8m Power Cord 250V Australia
23R7154	3580/3573	9834	2.8m Power Cord 250V Uruguay
23R7155	3580/3573	9840	2.8m Power Cord 250V China
23R7158	3580/3573	9835	2.8m Power Cord 125V Taiwan
23R7260	3573	8043	3573 Ultrium 3 LVD SCSI Tape Drive
23R7261	3573	8044	3573 Ultrium 3 Fibre Tape Drive
23R7262	3573	1901	Additional Power Supply
23R7263	N/A	N/A	3580 Storage Bid Machine Select
23R7335	N/A	N/A	3573 Storage Bid Machine Select
3572S3R	N/A	N/A	IBM TS2900 Tape Library model S3H w/LTO3 HH SAS drive and rack mount kit
3572S4R	N/A	N/A	IBM TS2900 Tape Library model S4H w/LTO4 HH SAS drive and rack mount kit
35732UL	N/A	N/A	IBM TS3100 Tape Library w/o Drive
35734UL	N/A	N/A	IBM TS3200 Tape Library w/o Drive
3580E4S	N/A	N/A	TS2240 External half-high Ultrium 4 Drive - ExpressSeller
3580S4E	N/A	N/A	TS2240 External half-high Ultrium 4 Drive
3580H3L	N/A	N/A	TS2230 Tape Drive Express Model H3L LTO3 half-high Tape Drive
3580L4X	3580	L43	TS2340 Tape Drive with LTO4 SCSI Tape Drive, with enclosure and power supply
3580L3E	N/A	N/A	TS2230 External half-high Ultrium 3 Tape Drive - Express Seller
3580S3E	3580	H3S	TS2230 Tape Drive Model H3S with LTO3 SAS half-high Tape Drive with enclosure and power supply
3580S4E	3580	H4S	half-high LTO 4 SAS Tape Drive with enclosure and power supply
3580S4X	3580	S43	TS2340 Tape Drive with LTO4 SAS Tape Drive, with enclosure and power supply
45E2225	3573	8106	3573 Left Upper 4U Magazine
45E2231	3573	8107	3573 Left Lower 4U Magazine
45E2237	3573	8108	3573 Left Side 2U Magazine
45E2243	3573	8109	LTO Ultrium 4 half-high SAS Drive
45E3081	3573	6900	Transparent LTO Encryption
45E9503	3573	N/A	Path Failover
95P2020	3573	8305	Ultrium 3 Data Cartridge (GEN 3) 5-Pack
95P4278	3573	8405	Ultrium 4 Data Cartridges (5 Pack)
95P4711	3580/3573	5402	2.0M SAS/Mini-SAS 1X Cable
95P4713	3580/3573	5502	2.0M Mini-SAS/Mini-SAS 1X Cable
95P4994	3573	5400	SAS/Mini-SAS 4X Interposer
95P4996	3573	5500	Mini-SAS/Mini-SAS Interposer
95P4998	3573	8046	Ultrium 3 half-high LVD SCSI Tape Drive

P/N	MACH	MOD	Description
95P5000	3573	8047	Ultrium 3 half-high SAS Tape Drive
95P5002	3573	8143	Ultrium 4 LVD SCSI Drive
95P5004	3573	8144	Ultrium 4 Fibre Channel Drive
95P5006	3573	8145	Ultrium 4 SAS Channel Drive
95P5008	3573	9900	Encryption Configuration
96P1565	3580	7003	19-INCH RACK MOUNT KIT
96P1629	3580/3573	5602	2.5M SCSI VHDCI/HD68 Cable
96P1630	3580/3573	5604	4.5M SCSI VHDCI/HD68 Cable
96P1631	3580/3573	5610	10.0M SCSI VHDCI/HD68 Cable

TS2900 Tape Autoloaders

MACH	P/N	MOD	Description
7006	45E3785		3572 Rack Mount Kit
7010	45E3789		3572 Deskside Covers
8111	45E3793		3572 Additional Magazine
5901	45E3797		Transparent LTO Encryption
8002	23R7008		Ultrium Cleaning Cartridge
8305	95P2020		Ultrium 3 Data Cartridges 5-pack
8405	95P4278		Ultrium 4 Data Cartridges 5-pack
5402	95P4711		2 m SAS/Mini-SAS 1x Cable
5502	95P4713		2 m Mimi-SAS/Mini-SAS 1x Cable
9800	23R7141		2.8 m Power Cord 125v U.S./Canada
9986	23R7143		1.8 m Power Cord 125v Chicago
9833	23R7145		2.8 m Power Cord 250v U.S./Canada
9820	23R7146		2.8 m Power Cord 250v France/Germany
9821	23R7147		2.8 m Power Cord 250v Denmark
9825	23R7148		2.8 m Power Cord 250v UK
9827	23R7149		2.8 m Power Cord 250v Israel
9828	23R7150		2.8 m Power Cord 250v Switzerland
9829	23R7151		2.8 m Power Cord 250v S. Africa
9830	23R7152		2.8 m Power Cord 250v Italy
9831	23R7153		2.8 m Power Cord 250v Australia
9834	23R7154		2.8 m Power Cord 250v Uruguay/Argentina
9835	23R7158		2.8 m Power Cord 125v Taiwan
9840	23R7155		2.8 m Power Cord 250v China (PRC)
9841	23R6981		2.8 m Power Cord 250v Taiwan
9842	23R6982		2.8 m Power Cord 125v Japan
9843	23R6983		2.8 m Power Cord 250v Japan
9844	23R6984		2.8 m Power Cord 250v Korea
9845	23R6985		2.8 m Power Cord 250v India
9846	23R6986		2.8 m Power Cord 125v Brazil/Japan
9847	23R6987		2.8 m Power Cord 250v Brazil

Appendix E: Fibre Channel Switch and Director Offerings

IBM System Storage SAN b-type (Brocade) Switches and SAN routers

Machine Type	Model	HVEC Part Number	Description
2005	B5K	20055KB	IBM System Storage SAN16B-3 fabric switch
2005	R04		IBM System Storage SAN04B-R
2498	B24	249824E	IBM System Storage SAN24B-4 Express fabric switch
2498	B40	249840E	IBM System Storage SAN40B-4
2498	B80		IBM System Storage SAN80B-4
2499	384		IBM System Storage SAN768B
2005	R18		IBM System Storage SAN18B-R router switch

Cisco MDS 9000 for IBM System Storage Switches and routers

Machine Type	Model	HVEC Part Number	Description
2053	424	241724C	Cisco MDS 9124 Express for IBM System Storage fabric switch
2053	434		Cisco MDS 9134 for IBM System Storage fabric switch
2053	S34		Cisco MDS 9134 for IBM System Storage stacked switch
2054	E01		Cisco MDS 9222i for IBM System Storage modular router switch

IBM System Storage SAN b-type (Brocade) and m-type (McDATA) Directors

Machine Type	Model	HVEC Part Number	Description
2109	M48		IBM TotalStorage SAN256B director
2109	C36		IBM TotalStorage SAN Cabinet C36
2499	384		IBM System Storage SAN768 fabric backbone

Cisco MDS 9500 for IBM System Storage Directors

Machine Type	Model	HVEC Part Number	Description
2054	E04		Cisco MDS 9506 for IBM System Storage director
2054	E07		Cisco MDS 9509 for IBM System Storage director
2054	E11		Cisco MDS 9513 for IBM System Storage director